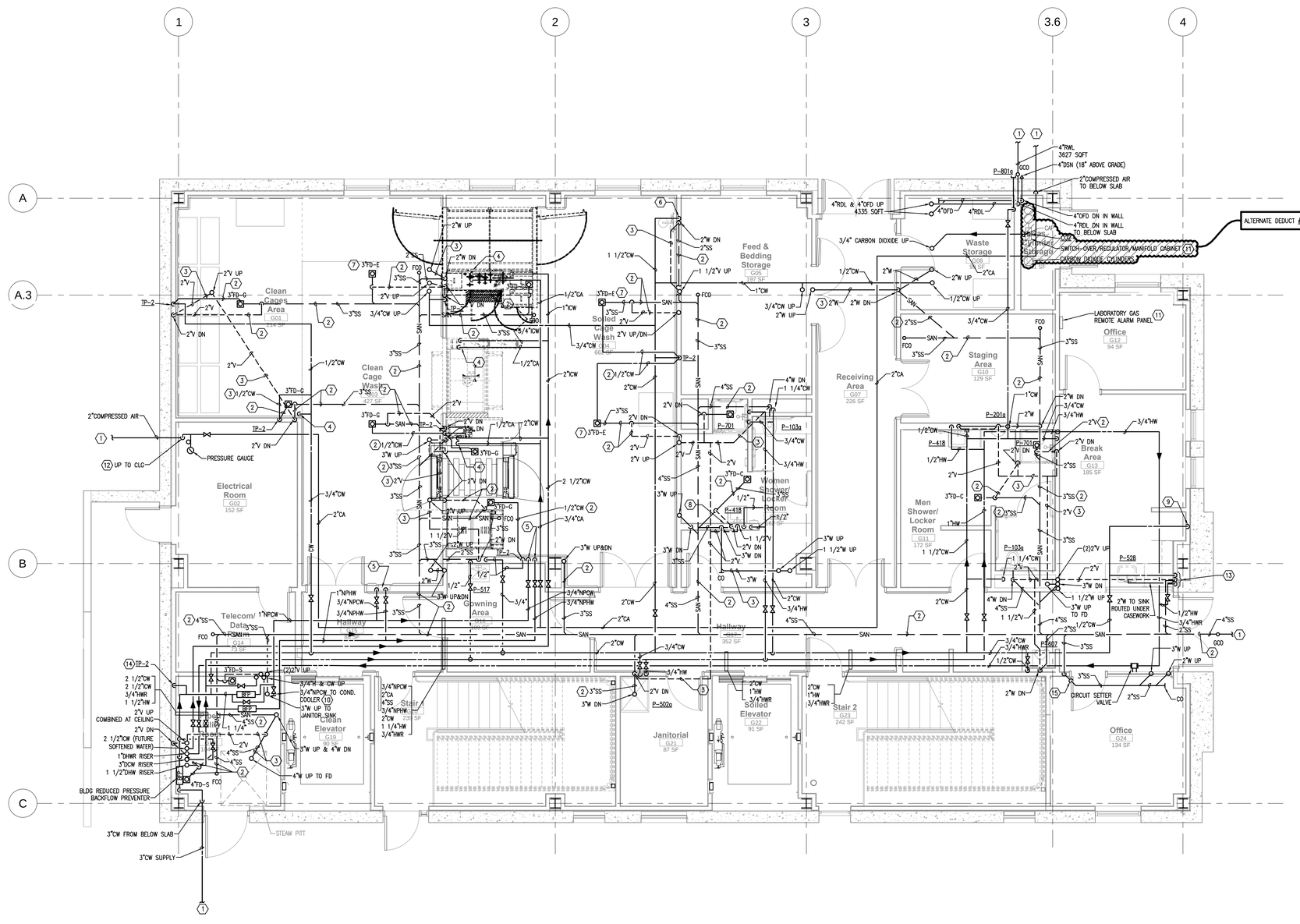

1 PLUMBING GROUND FLOOR PLAN
1/4" = 1'-0"

GENERAL NOTES:

A. REFER TO ARCHITECTURAL PLANS FOR EXACT ROOF DRAIN LOCATIONS.
B. ROOF DRAIN PIPING SIZES BASED ON 1.5"/HR RAINFALL.
C. COORDINATE PIPING ROUTING IN CEILING PLENUM WITH OTHER DISCIPLINES PRIOR TO INSTALLATION.

KEYED NOTES:

1. REFER TO CIVIL DWGS FOR CONTINUATION.
2. PIPING BELOW FLOOR/SLAB.
3. PIPING AT CEILING.
4. STUB PIPING DOWN THRU CEILING AND TERMINATE WITH VALVE AND CAP AT 12 INCHES BELOW CEILING FOR CONNECTION OF EQUIPMENT BY OTHERS. COORDINATE FINAL LOCATION OF CEILING PENETRATIONS WITH EQUIPMENT PROVIDER.
5. 3/4"NPH&CW DOWN IN WALL TO MIXING VALVE SERVING HOSE REEL. EQUIPMENT IS PART OF SPEC. SECTION 115343.
6. 1 1/4"CW DOWN IN WALL TO EMERGENCY SHOWER AND EYEWASH. EQUIPMENT IS PART OF SPEC. SECTION 115343.
7. PROVIDE MESH LINING FOR SEDIMENT BUCKET.
8. ROUTE 1 1/2"W IN WALL AND CONNECT TO 3"W DN.
9. PROVIDE A 1/2"CW SUPPLY RISER IN WALL TO AN ISOLATION STOP VALVE AT THE ACCESSIBLE SIDE OF THE WALL FOR CONNECTION TO ICE MAKER IN REFRIGERATOR.
10. REFER TO DETAIL F6, DWG M-505.
11. [redacted]
12. INSTALL GAS PRESSURE GAUGE AT ACCESSIBLE HEIGHT.
13. PROVIDE CW, HW, W, AND V IN WALL AS SHOWN ON PLAN. ROUTE PIPE WORK UNDER CASE-WORK TO PROVIDE CONNECTIONS TO SINK. VENT SHALL BE CONNECTED TO WASTE IN WALL AS SHOWN ON PLAN. ROUTE WASTE UNDER CASEWORK TO WALL AND CONNECT TO UNDERGROUND MAIN AS SHOWN ON PLAN.
14. PROVIDE 1/2"CW ABOVE CEILING TO CONNECT TO TRAP PRIMER LOCATED IN WALL AS SHOWN ON PLAN. PROVIDE TWO 1/2"CW BELOW SLAB FROM TRAP PRIMER TO CONNECT TO EACH FLOOR DRAIN LOCATED IN PIPED UTILITY ROOM G18.
15. PROVIDE OFFSETS AND ACCESSIBLE CLEAN-OUT ABOVE CEILING IN ORDER TO SUIT DUCTWORK. REFER TO MECHANICAL DRAWINGS AND COORDINATE WITH MECHANICAL TRADE.

three inches = one foot
one and one-half inch = one foot
one inch = one foot
three-quarters inch = one foot
one-half inch = one foot
three-eighth inch = one foot
one-quarter inch = one foot
one-eighth inch = one foot

NO	REVISIONS	DATE

CONSULTANTS:

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			GEOTECHNICAL/ ENVIRONMENTAL SERVICES:	HISTORICAL ARCHITECTURE:	COST ESTIMATING:
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CONSULTANT:

ARCHITECTS/ENGINEERS:

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PH:415-546-4200 FAX:415-546-4202

Drawing Title
PLUMBING
GROUND FLOOR PLAN

Approved : Project Director

Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date: **04 March 2011** | Checked by: BJ | Drawn: DB

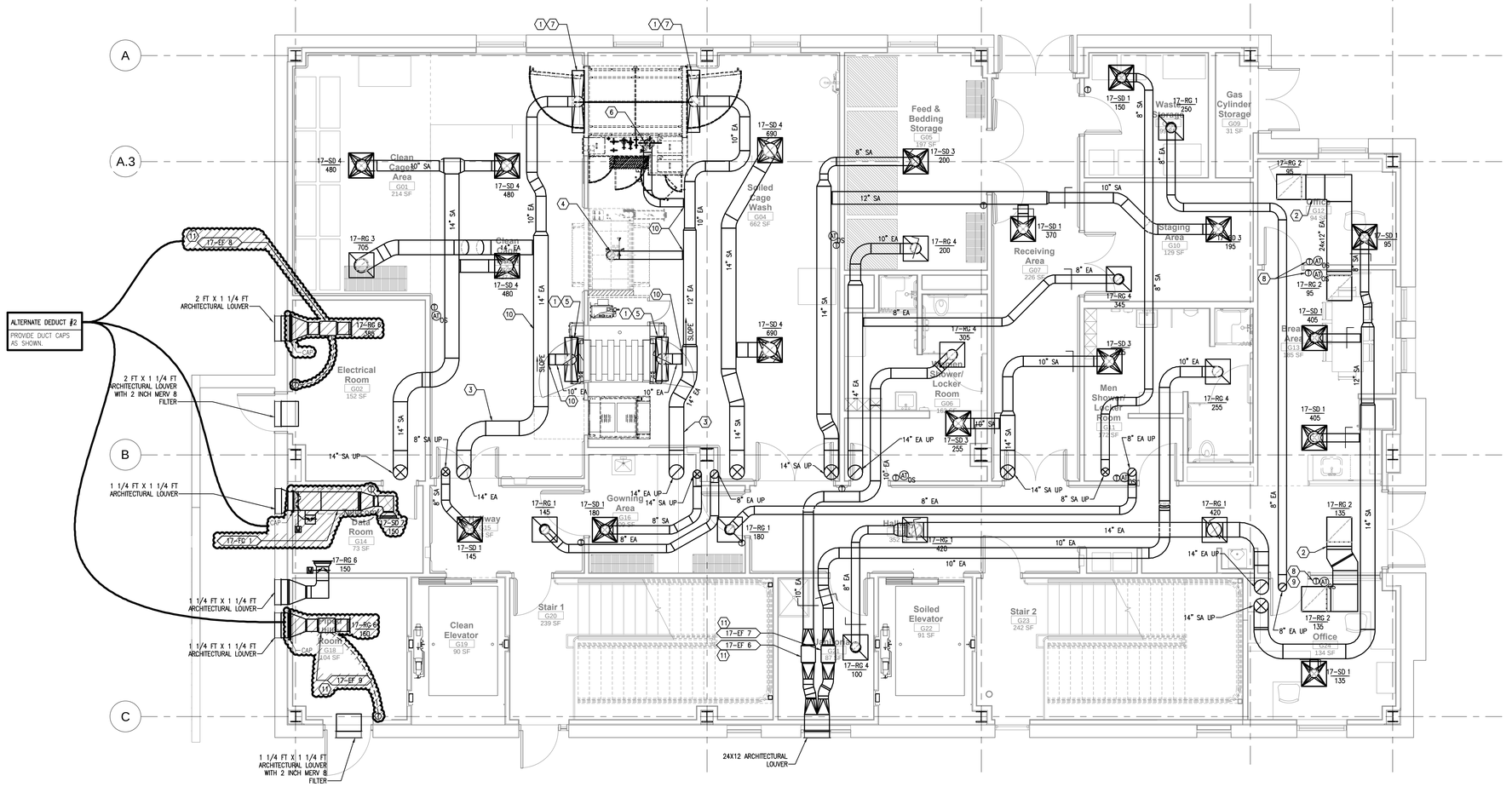
Project Number: **662-10-608**
Building Number: **17**
Drawing number: **P-10G**

Office of Construction and Facilities Management
Department of Veterans Affairs

N

Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED



1 MECHANICAL HVAC GROUND FLOOR PLAN
1/4" = 1'-0"

GENERAL NOTES:

A. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING, UNLESS NOTED OTHERWISE.
B. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
C. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
D. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
E. REFER TO EQUIPMENT SCHEDULES FOR DIFFUSER, REGISTER AND GRILLE NECK SIZES. DUCT SIZES SHOWN ON FLOOR PLANS SHALL REQUIRE TRANSITIONS TO CONNECT TO DIFFUSERS, REGISTERS AND GRILLES.
F. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
G. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
H. SEISMIC PROVISIONS REQUIRED – SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED
I. PROVIDE THERMOSTAT COMMUNICATION CABLE FROM ALL THERMOSTAT TO THE ASSOCIATED TERMINAL UNIT OR AIR VALVE.
J. ALL SUPPLY AND EXHAUST DUCTWORK BETWEEN AIR MOVING EQUIPMENT AND AIR-VALVES SHALL BE CONSTRUCTED TO A 4 INCH WATER GAUGE PRESSURE CLASS. ALL SUPPLY AND EXHAUST DUCTWORK BETWEEN THE AIR-VALVES AND THE ROOM OUTLETS/INLETS SHALL BE CONSTRUCTED TO A 2 INCH WATER GAUGE PRESSURE CLASS.

KEYED NOTES:

1. EXHAUST HOOD SHALL BE LOCATED DIRECTLY ABOVE STERILIZER DOORS AND WITHOUT CONFLICTING WITH OPENING STERILIZER DOORS. SEE DETAIL D1/M-502. SEE DETAIL F1/M-501 FOR DUCT PENETRATION THRU FINISHED CEILING.
2. TRANSFER DUCT SHALL BE LINED FOR THE ENTIRE DUCTWORK. SEE DETAIL F2/M-502.
3. PROVIDE DUCTWORK IN 316 STAINLESS STEEL MATERIAL WHERE THIS KEYED NOTE IS INDICATED. SLOPE DUCTWORK TO 316 STAINLESS STEEL HOODS SHOWN ON PLAN TO ALLOW ANY CONDENSATION TO BE RELIEVED AT THE HOOD.
4. DUCTWORK SHALL BE CONCEALED ABOVE FINISHED CEILING. EXHAUST DUCTWORK SHALL TERMINATE 12 INCHES BELOW FINISHED CEILING. PROVIDE A FLANGE WITH A CAP FOR FUTURE CONNECTION TO EQUIPMENT. COORDINATE CONNECTION REQUIREMENTS WITH EQUIPMENT BEING PROVIDED. FUTURE EXHAUST AIR SHALL BE BALANCED TO 355 CFM. SEE DETAIL F1/M-501 FOR DUCT PENETRATION THRU FINISHED CEILING.
5. PROVIDE A 3 1/2 FT. 316 STAINLESS STEEL EA HOOD. EA DUCTWORK SHALL PENETRATE FINISHED CEILING. PROVIDE A VOLUME DAMPER BELOW FINISHED CEILING AND BALANCE EA TO 285 CFM (TYPICAL OF 2). SEE DETAIL F1/M-501 FOR DUCT PENETRATION THRU FINISHED CEILING. SEE DETAIL D1/M-502 FOR HOOD CONSTRUCTION.
6. DUCTWORK SHALL BE CONCEALED ABOVE FINISHED CEILING. EXHAUST DUCTWORK SHALL TERMINATE 12 INCHES BELOW FINISHED CEILING. PROVIDE A FLANGE WITH A CAP FOR FUTURE CONNECTION TO EQUIPMENT. COORDINATE CONNECTION REQUIREMENTS WITH EQUIPMENT BEING PROVIDED. FUTURE EXHAUST AIR SHALL BE BALANCED TO 590 CFM. SEE DETAIL F1/M-501 FOR DUCT PENETRATION THRU FINISHED CEILING.
7. PROVIDE A 5 FT. 316 STAINLESS STEEL EA HOOD. EA DUCTWORK SHALL PENETRATE FINISHED CEILING. PROVIDE A VOLUME DAMPER BELOW FINISHED CEILING AND BALANCE EA TO 350 CFM (TYPICAL OF 2). SEE DETAIL F1/M-501 FOR DUCT PENETRATION THRU FINISHED CEILING. SEE DETAIL D1/M-502 FOR HOOD CONSTRUCTION.
8. THERMOSTATS SHALL ALLOW FOR TEMPERATURE AVERAGING WITH ASSOCIATED AREAS (TYP OF 3).
9. THERMOSTAT AND OCCUPANCY SENSOR SHALL BE MOUNTED AT 39 INCHES ABOVE FINISHED FLOOR.
10. ALL BRANCH CONNECTIONS SHALL ROLL DOWN FROM THE SUB-MAIN SUCH THAT ANY CONDENSATE IN THE DUCTWORK SHALL FLOW BACK TO THE EXHAUST HOODS. THE SUB-MAIN SHALL ALSO SLOPE A MINIMUM OF 2 INCHES FROM THE RISER TO THE LAST ELBOW.
11. SEE DETAIL B8/M-502 FOR IN LINE FAN HORIZONTAL MOUNTING DETAIL.

Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED

NO	REVISIONS	DATE

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Drawing Title: MECHANICAL HVAC GROUND FLOOR PLAN

Approved : Project Director

Project Title: **VMU Replacement And Expansion Project**

Location: San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121

Date: 04 March 2011 | Checked by: BJ | Drawn: ET

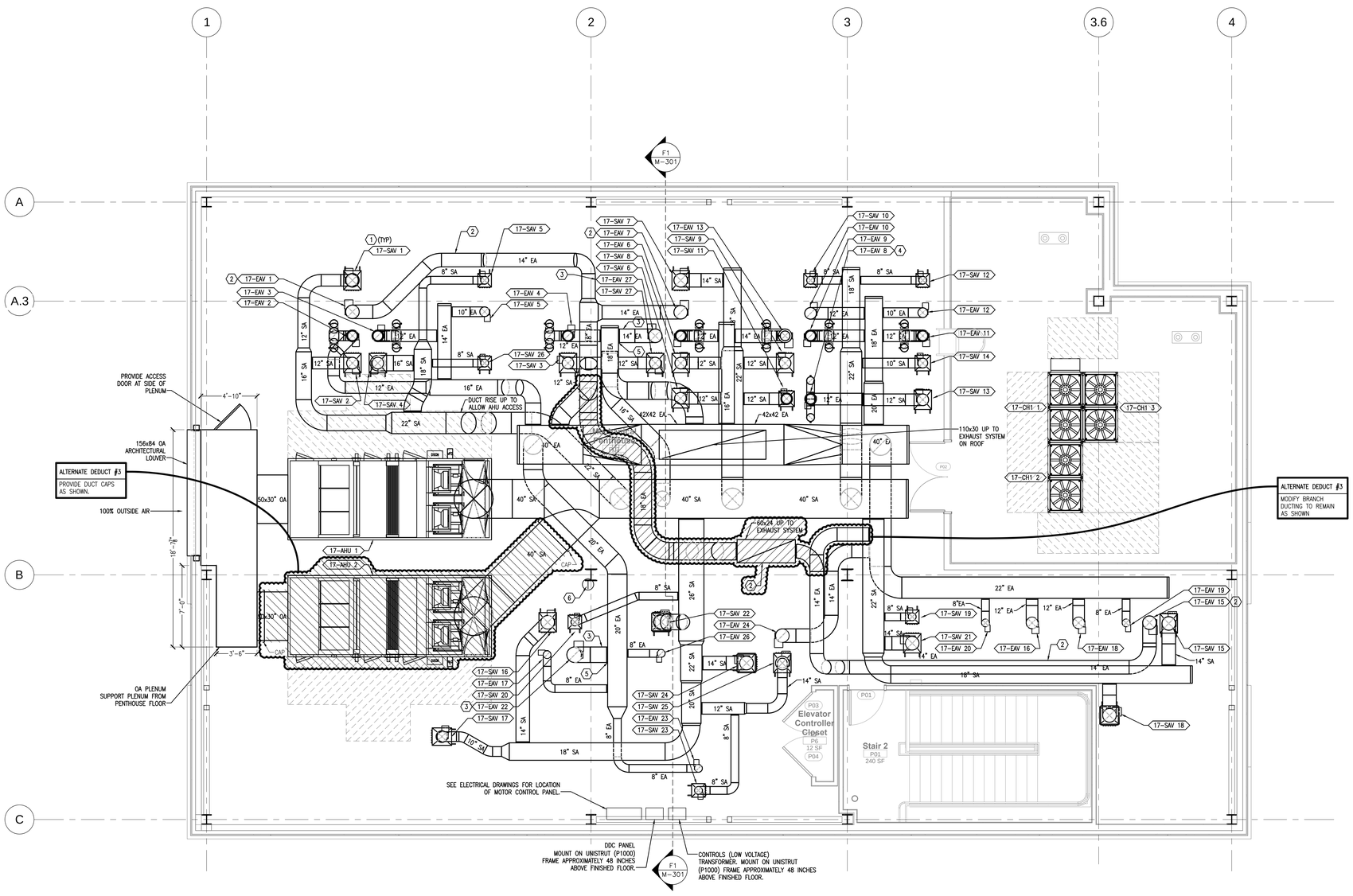
Project Number: 662-10-608

Building Number: 17

Drawing number: MH-10G

Office of Construction and Facilities Management

Department of Veterans Affairs



GENERAL NOTES:

A. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
B. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
C. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
D. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
E. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
F. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
G. ALL SUPPLY AND EXHAUST DUCTWORK BETWEEN AIR MOVING EQUIPMENT AND AIR-VALVES SHALL BE CONSTRUCTED TO A 4 INCH WATER GAUGE PRESSURE CLASS. ALL SUPPLY AND EXHAUST DUCTWORK BETWEEN THE AIR-VALVES AND THE ROOM OUTLETS/INLETS SHALL BE CONSTRUCTED TO A 2 INCH WATER GAUGE PRESSURE CLASS.
H. ALTITUDE-MECHANICAL PENTHOUSE FLOOR:
   40 FT. [12 M] ABOVE SEA LEVEL
I. SEISMIC PROVISIONS REQUIRED – SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED
J. SUPPLY AND EXHAUST AIR DUCTWORK PENETRATIONS AT MECHANICAL PENTHOUSE FLOOR SHALL BE COORDINATED WITH STRUCTURAL PRIOR TO COMMENCEMENT OF WORK. SUPPLY AIR DUCTWORK SHALL CONTINUE FROM THE MECHANICAL PENTHOUSE LEVEL WITH THE RECTANGULAR F/SDPR DIMENSIONS TO FLOOR BELOW AS SHOWN ON MH-101.

KEYED NOTES:

1. PROVIDE A FIRE/SMOKE DAMPER FOR ALL SUPPLY AIR BRANCH DUCTWORK. FIRE/SMOKE DAMPER SHALL BE LOCATED AT THE BASE OF THE BRANCH DUCTWORK BEFORE PENETRATING THE PENTHOUSE FLOOR. REFER TO DETAIL B4/M-504 AND D6/M-505.
2. PROVIDE ENTIRE EXTENT OF DUCTWORK IN 316 STAINLESS STEEL MATERIAL.
3. PROVIDE THE ENTIRE BRANCH DUCTWORK IN 316 STAINLESS STEEL MATERIAL AND CONNECT TO GALVANIZED DUCTWORK MAIN IN PENTHOUSE.
4. REFER TO DETAIL F1/M-505 FOR EXHAUST DUCTWORK ARRANGEMENT IN THE VERTICAL FOR 17-EAV 8. SEE DETAIL D4/M-505 FOR TYPICAL EXHAUST DUCTWORK ARRANGEMENT IN THE VERTICAL AT THE EXHAUST AIR VALVE SERVING THE ANIMAL HOLDING ROOMS. SEE SECTION F1/M-301 FOR TYPICAL SUPPLY AND EXHAUST DUCTWORK IN MECHANICAL PENTHOUSE.
5. INTERFACE POINT BETWEEN GALVANIZED AND STAINLESS STEEL DUCTWORK.
6. PROVIDE THERMOSTAT MOUNTED ON COLUMN TO ENERGIZE EF-10. SET AT 80 DEGREE FAHRENHEIT.

1 MECHANICAL HVAC PENTHOUSE PLAN
1/4" = 1'-0"

N

Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED

NO	REVISIONS	DATE

CONSULTANTS:

ARCHITECTURE/ INTERIOR DESIGN/ LABORATORY PLANNING/ ENVIRONMENTAL ASSESSMENT:	MECHANICAL/ELECTRICAL/ PLUMBING:	STRUCTURAL:	CIVIL / SURVEYOR:	LANDSCAPE:	FIRE PROTECTION:
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			GEOTECHNICAL/ ENVIRONMENTAL SERVICES:	HISTORICAL ARCHITECTURE:	COST ESTIMATING:
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Drawing Title
MECHANICAL HVAC PENTHOUSE PLAN

Approved : Project Director

Project Title
VMU Replacement And Expansion Project

Location: **San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121**

Date	Checked by	Drawn
04 March 2011	BJ	ET

Project Number: 662-10-608

Building Number: 17

Drawing number: MH-10P

Office of Construction and Facilities Management

Department of Veterans Affairs

three inches = one foot
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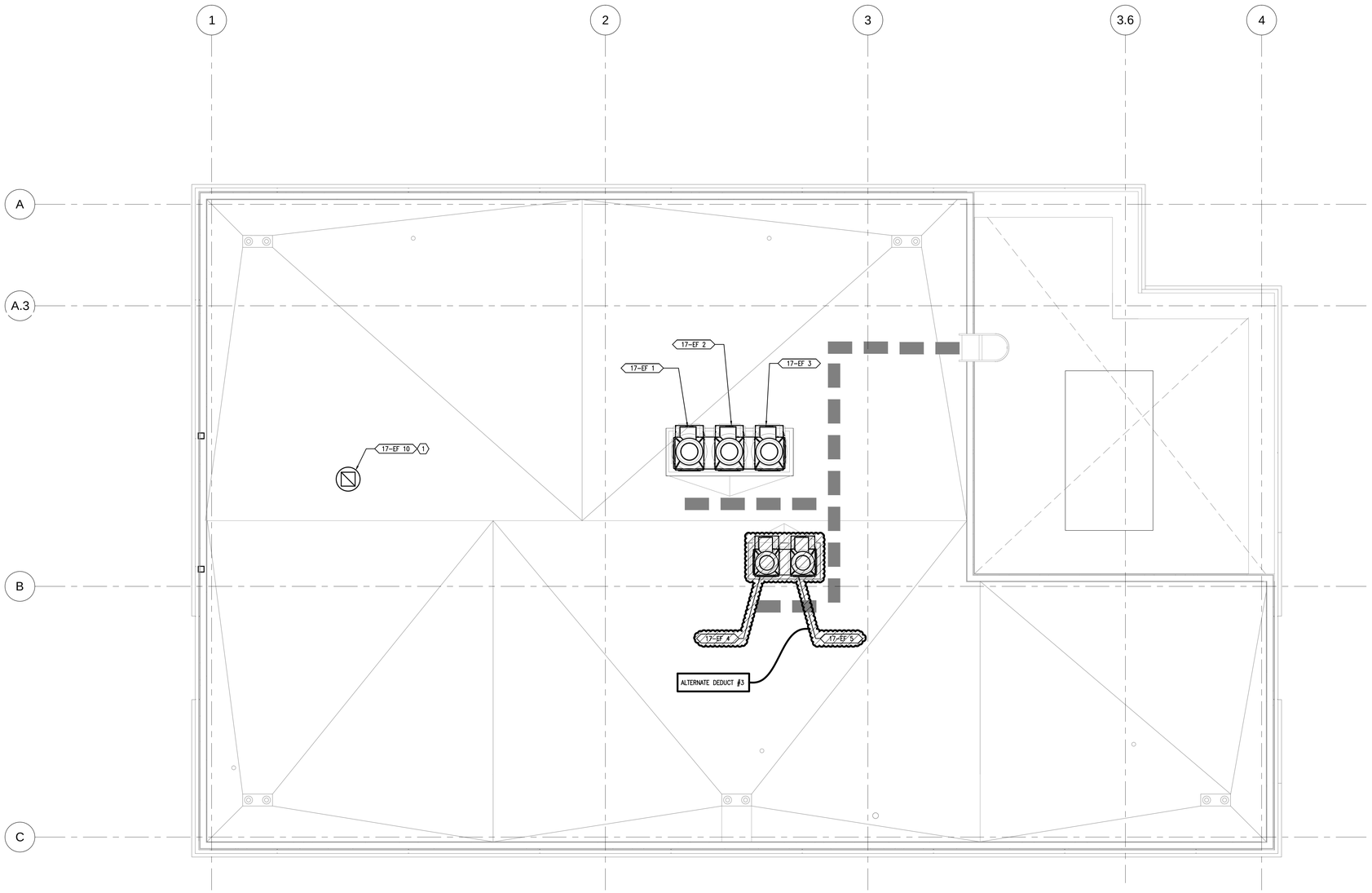

GENERAL NOTES:

A. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS.
B. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
C. ALTITUDE–MECHANICAL PENTHOUSE FLOOR:
   40 FT. [12 M] ABOVE SEA LEVEL
D. SEISMIC PROVISIONS REQUIRED – SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED

⬡ KEYED NOTES:

1. SEE DETAIL D2/M-505 AND ARCHITECTURAL ROOF DETAIL FOR EXHAUST FAN INSTALLATION.

1 MECHANICAL HVAC ROOF PLAN
1/4" = 1'-0"

N

Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED

NO	REVISIONS	DATE

CONSULTANTS:

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Drawing Title
MECHANICAL HVAC ROOF PLAN

Approved : Project Director

Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date
04 March 2011

Checked by
BJ

Drawn
ET

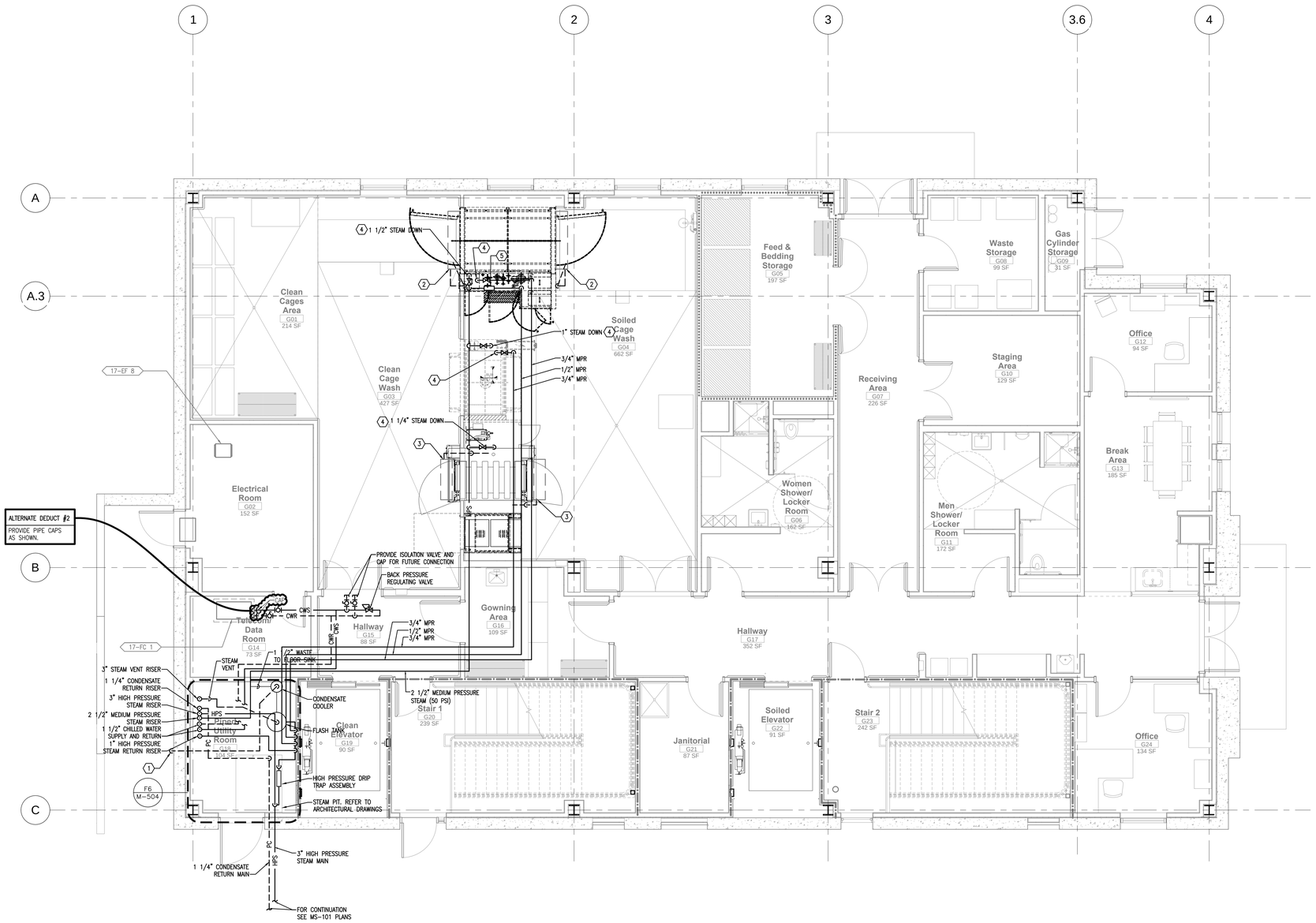
Project Number
662-10-608

Building Number
17

Drawing number
MH-10R

Office of Construction and Facilities Management

Department of Veterans Affairs



GENERAL NOTES:

A. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN A FURRED CHASE OR ABOVE THE HARD SUSPENDED CEILING.
B. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
C. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
D. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
E. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF CEILING DIFFUSERS, REGISTERS, AND GRILLES.
F. STEAM HEADER SET PRESSURE:
100 PSIG [690 kPa] NORMAL
G. SEISMIC PROVISIONS REQUIRED – SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED

KEYED NOTES:

1. PROVIDE A 3/4" CONDENSATE COOLER STEAM VENT THRU EXTERIOR WALL AND TURN DOWN ONCE AT EXTERIOR TO VENT AT A SAFE LOCATION.
2. PROVIDE 1/2" DRAIN FROM CANOPY EXHAUST HOOD DRAIN LIP AND TERMINATE 2 INCHES ABOVE FLOOR DRAIN LOCATED BELOW GRATING SHOWN ON P-10G. SEE MH-10G FOR LOCATION OF CANOPY HOODS AND DETAIL D1/M-502.
3. PROVIDE 1/2" DRAIN FROM CANOPY EXHAUST HOOD DRAIN LIP DOWN TO FLOOR DRAIN SHOWN ON P-10G. TERMINATE PIPE 2 INCHES ABOVE FLOOR DRAIN. SEE MH-10G FOR LOCATION OF CANOPY HOODS AND DETAIL D1/M-502.
4. STUB PIPING DOWN THRU CEILING AND TERMINATE WITH VALVE AND CAP AT 12 INCHES BELOW CEILING FOR CONNECTION OF OFOI EQUIPMENT. COORDINATE FINAL LOCATION OF CEILING PENETRATIONS WITH EQUIPMENT PROVIDER. VALVE SHOWN IN THE HORIZONTAL ON PLAN IS FOR CLARITY ONLY AND SHALL NOT BE PROVIDED ABOVE THE CEILING.
5. END OF LINE DRIP ASSEMBLY. SIZE FOR 700 LBS/HR AT 60 PSIG DIFFERENTIAL PRESSURE. SEE DETAIL B2/M-502.

1 MECHANICAL PIPING GROUND FLOOR PLAN

1/4" = 1'-0"

N

Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED

NO	REVISIONS	DATE

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Drawing Title
MECHANICAL PIPING GROUND FLOOR PLAN

Approved : Project Director

Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date: **04 March 2011** | Checked by: BJ | Drawn: ET

Project Number: **662-10-608**

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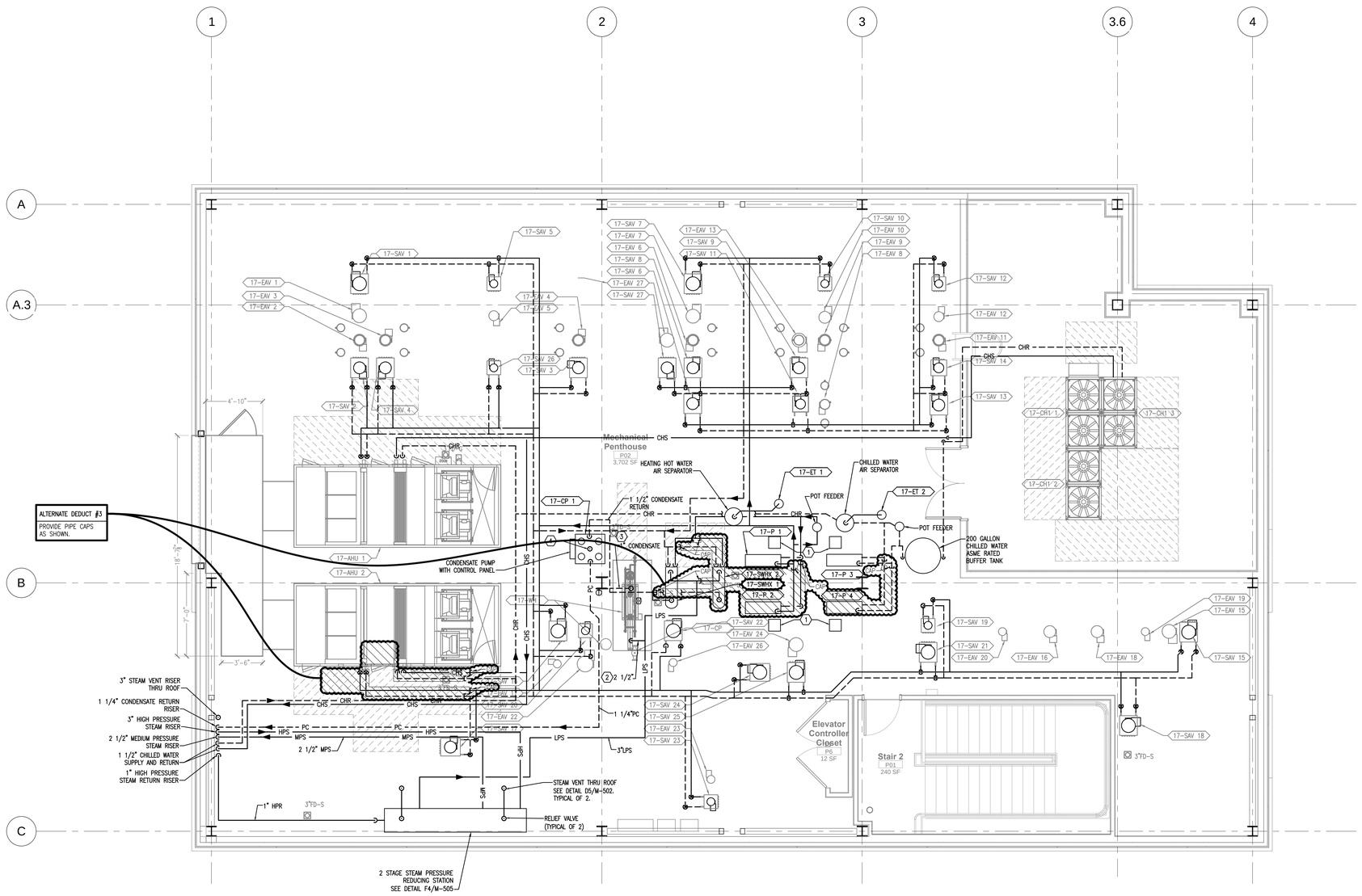
Drawing number: **MP-10G**

Office of Construction and Facilities Management

Department of Veterans Affairs



1 MECHANICAL PIPING PENTHOUSE PLAN
1/4" = 1'-0"

GENERAL NOTES:

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D. TOTAL STATIC PRESSURE NOTED IN THE SCHEDULES INCLUDES DUCT SYSTEM, TERMINAL UNITS, FILTERS, COILS, ETC.
E. FOR TYPICAL STEAM AND WATER PIPING CONNECTIONS TO EQUIPMENT, SEE STANDARD EQUIPMENT DETAILS.
F. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
G. ALTITUDE-MECHANICAL PENTHOUSE FLOOR:
   40 FT. [12 M] ABOVE SEA LEVEL
H. SEISMIC PROVISIONS REQUIRED -- SEE SPECS. ALL PRESSURES LISTED ARE GAGE PRESSURE UNLESS OTHERWISE NOTED.
I. REFER TO FLOW DIAGRAMS AND DETAILS FOR PIPE SIZES.

KEYED NOTES:

1. PROVIDE ADJUSTABLE FREQUENCY DRIVES ON UNISTRUT FRAME (P1000) AND SUPPORT FROM PENTHOUSE FLOOR. SEE STRUCTURAL DRAWINGS FOR ANCHOR REQUIREMENTS.
2. 2 1/2"ø LPS TO WATER HEATER. UNIT REQUIRES TWO STEAM CONNECTIONS. REFER TO DETAIL C5/P-501.
3. 1"ø CONDENSATE RETURN FROM WATER HEATER. UNIT REQUIRES TWO CONDENSATE CONNECTIONS. REFER TO DETAIL C5/P-501.
4. 2" VENT THRU ROOF. EXTEND STEAM VENT TO 5 FT ABOVE ROOF.

three inches = one foot
one and one-half inch = one foot
one inch = one foot
three-quarters inch = one foot
one-half inch = one foot
three-eighth inch = one foot
one-quarter inch = one foot
one-eighth inch = one foot

NO	REVISIONS	DATE

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Drawing Title: MECHANICAL PIPING PENTHOUSE PLAN

Approved : Project Director

Project Title: **VMU Replacement And Expansion Project**

Location: **San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121**

Date: **04 March 2011** | Checked by: BJ | Drawn: RM

Project Number: **662-10-608**

Building Number: **17**

Drawing number: **MP-10P**

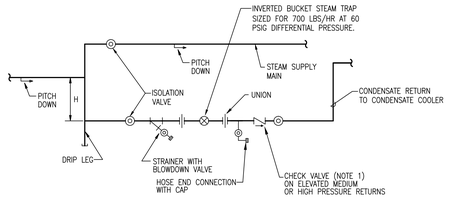
Office of Construction and Facilities Management

Department of Veterans Affairs

N

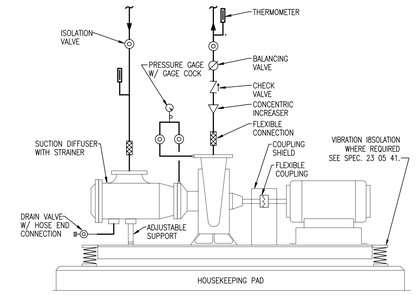
Contract Documents Submission (CD3 - 100%)

FULLY SPRINKLERED



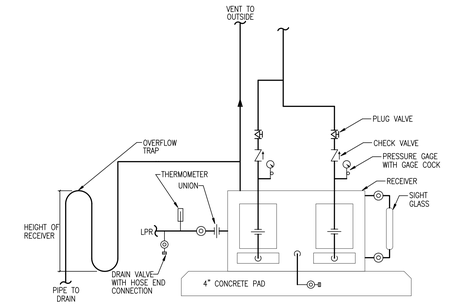
NOTES:
1. ELEVATED RETURN MAINS ON LOW PRESSURE SYSTEMS SHALL NOT BE PERMITTED.
2. FOR 4 IN. STEAM MAIN AND SMALLER, DRIP LEG SHALL BE FULL LINE SIZE.
3. H = 1.5 x PIPE DIAMETER, BUT NOT LESS THAN 8 IN.

B1 NOT USED
NTS



B2 END OF STEAM MAIN DRIP DETAIL
NTS

B4 FLEXIBLE COUPLED END SUCTION PUMP DETAIL
NTS



B6 CONDENSATE PUMP PIPING DETAIL
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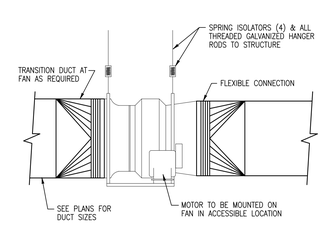
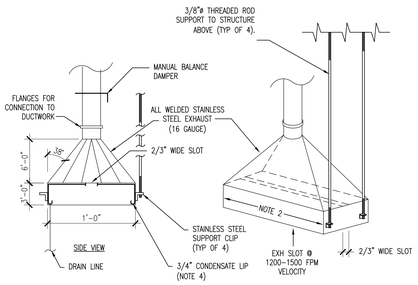
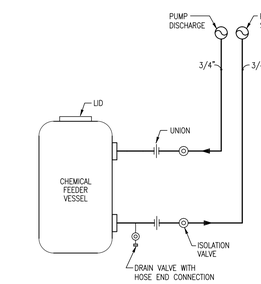


B8 IN-LINE FAN HORIZONTAL MOUNTING DETAIL
NTS

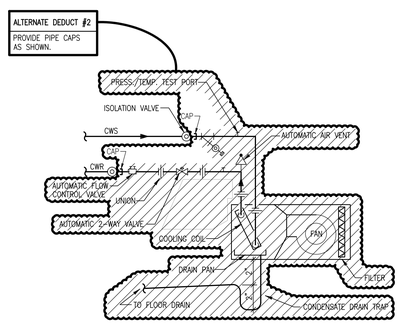


NOTES:
1. MOUNT BOTTOM OF EXHAUST HOOD 8" ABOVE STERILIZER OR CAGE WASH DOOR, CENTERED ON DOOR.
2. SEE PLANS FOR THE REQUIRED WIDTH OF HOOD.
3. COORDINATE INSTALLATION OF HOODS WITH INSTALLATION OF STERILIZERS.
4. PROVIDE A 3/4" CONDENSATE LIP AT CONTINUOUS INSIDE EDGE OF HOOD WITH 1/2" DRAIN CONNECTION. SEE PAINS FOR DRAIN LINE SIZE AND ROUTING.

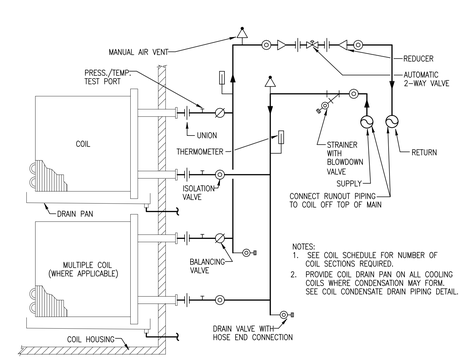
D1 STERILIZER / CAGE WASH EXHAUST HOOD
NTS



D2 SHOT TYPE CHEMICAL FEEDER PIPING DETAIL
NTS

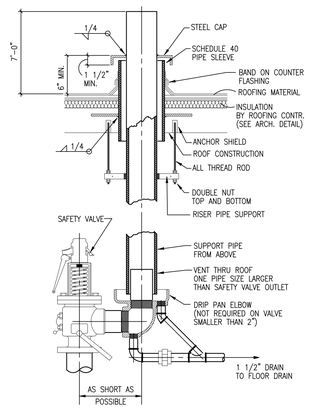


D4 FAN COIL UNIT PIPING DETAIL
NTS

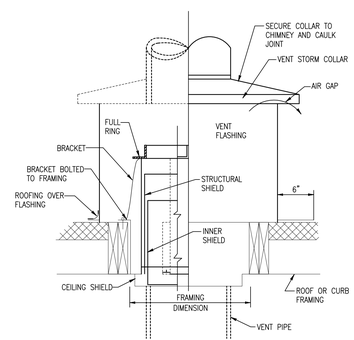


NOTES:
1. SEE COIL SCHEDULE FOR NUMBER OF COIL SECTIONS REQUIRED.
2. PROVIDE COIL DRAIN PAN ON ALL COOLING COILS WHERE CONDENSATION MAY FORM. SEE COIL CONDENSATE DRAIN PIPING DETAIL.

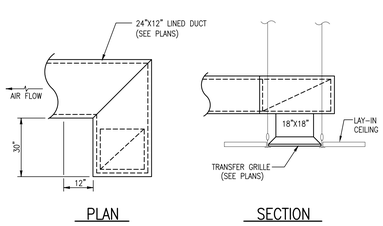
D6 COIL PIPING DETAIL
NTS



D8 STEAM RELIEF VENT THRU ROOF
NTS



F1 ROOF PENETRATION DETAIL
NTS



F2 TRANSFER AIR GRILLE BOOT DETAIL
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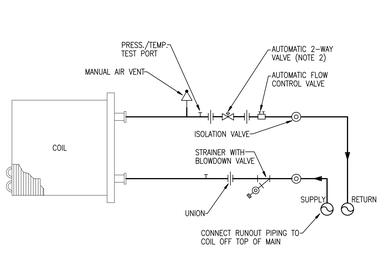
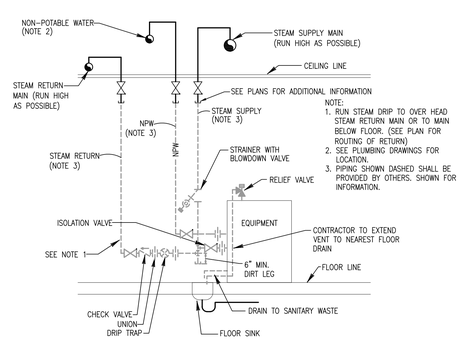


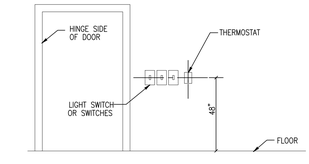
NOTES:
1. FOR RUNOUT PIPING SIZE REFER TO AIR TERMINAL UNIT SCHEDULE. MINIMUM RUNOUT PIPING SHALL BE 3/4".
2. PROVIDE AUTOMATIC 3-WAY VALVE IN LIEU OF 2-WAY VALVE WHERE INDICATED ON PLANS

F4 AIR TERMINAL UNIT REHEAT COIL PIPING DETAIL
NTS



NOTE:
1. RUN STEAM DRIP TO OVER HEAD STEAM RETURN MAIN OR TO MAIN BELOW FLOOR. (SEE PLAN FOR ROUTING OF RETURN)
2. SEE PLUMBING DRAWINGS FOR LOCATION.
3. PIPING SHOWN DASHED SHALL BE PROVIDED BY OTHERS. SHOWN FOR INFORMATION.

F6 STERILIZER STEAM AND PLUMBING CONNECTION
NTS



NOTE:
1. WHEN ABOVE MOUNTING PROCEDURE IS IMPOSSIBLE HINGE SIDE MOUNTING WILL BE PERMITTED WITH APPROX. 6" CLEARANCE FROM EDGE OF DOOR (IN OPEN POSITION) TO EDGE OF THERMOSTAT & LIGHT SWITCH. IF NEITHER INSTALLATION IS POSSIBLE, SWITCHES AND CONTROLS SHALL BE LOCATED AS DIRECTED BY ENGINEER. DO NOT INSTALL ABOVE DIMMER SWITCHES

F8 THERMOSTAT & SWITCH MOUNTING DETAIL UNLESS OTHERWISE SHOWN
NTS

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title: MECHANICAL DETAILS

Approved : Project Director

Project Title: **VMU Replacement And Expansion Project**

Location: **San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121**

Date: **04 March 2011** | Checked by: BJ | Drawn: RM

Project Number: **662-10-608**

Building Number: **17**

Drawing number: **M-502**

Office of Construction and Facilities Management

Department of Veterans Affairs

three inches = one foot 6" 0

one and one-half inch = one foot 6" 1 0

one inch = one foot 6" 2 0

three-quarters inch = one foot 6" 2 0

one-half inch = one foot 6" 4 0

three-eighth inch = one foot 6" 4 0

one-quarter inch = one foot 6" 8 4 0

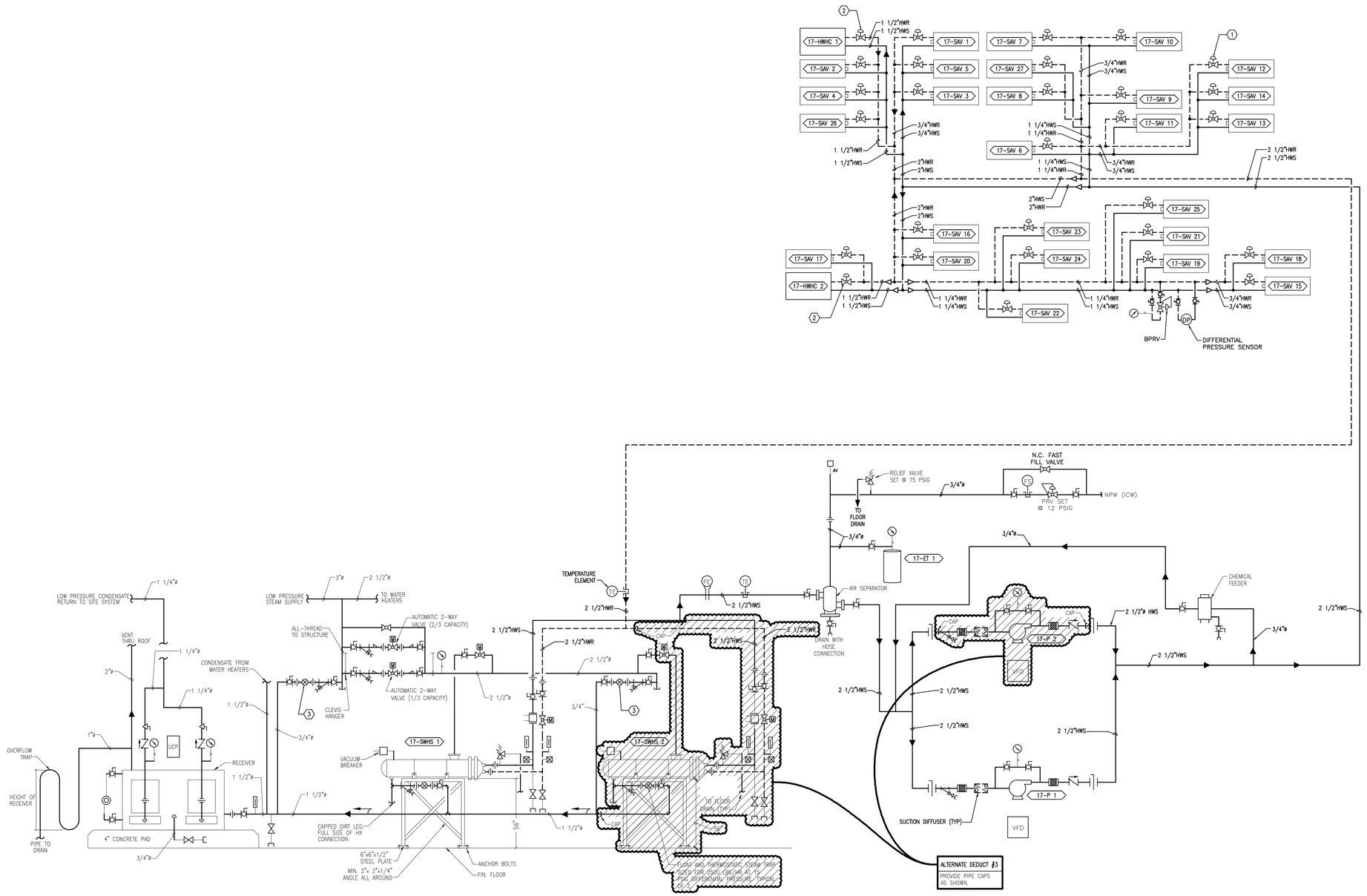
one-eighth inch = one foot 8 4 0 16

GENERAL NOTES:

A. –

⬡ KEYED NOTES:

1. FOR VALVES, FITTINGS AND ACCESSORIES AT REHEAT COIL (TYP), SEE DETAIL F4/M-502.
2. FOR VALVES, FITTINGS AND ACCESSORIES AT AIR HANDLING UNIT COIL (TYP), SEE DETAIL D6/M-502.
3. FLOAT & THERMOSTATIC STEAM TRAP. SIZE FOR 600 LBS/HR AT 10 PSIG DIFFERENTIAL PRESSURE.



F1 HEATING HOT WATER FLOW
NTS

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title
MECHANICAL HEATING HOT WATER FLOW DIAGRAMS

Approved : Project Director

Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date: **04 March 2011** | Checked by: BJ | Drawn: NB

Project Number: **662-10-608**

Building Number: **17**

Drawing number: **M-701**

Office of Construction and Facilities Management

Department of Veterans Affairs

three inches = one foot
one and one-half inch = one foot
one inch = one foot
three-quarters inch = one foot
one-half inch = one foot
three-eighth inch = one foot
one-quarter inch = one foot
one-eighth inch = one foot

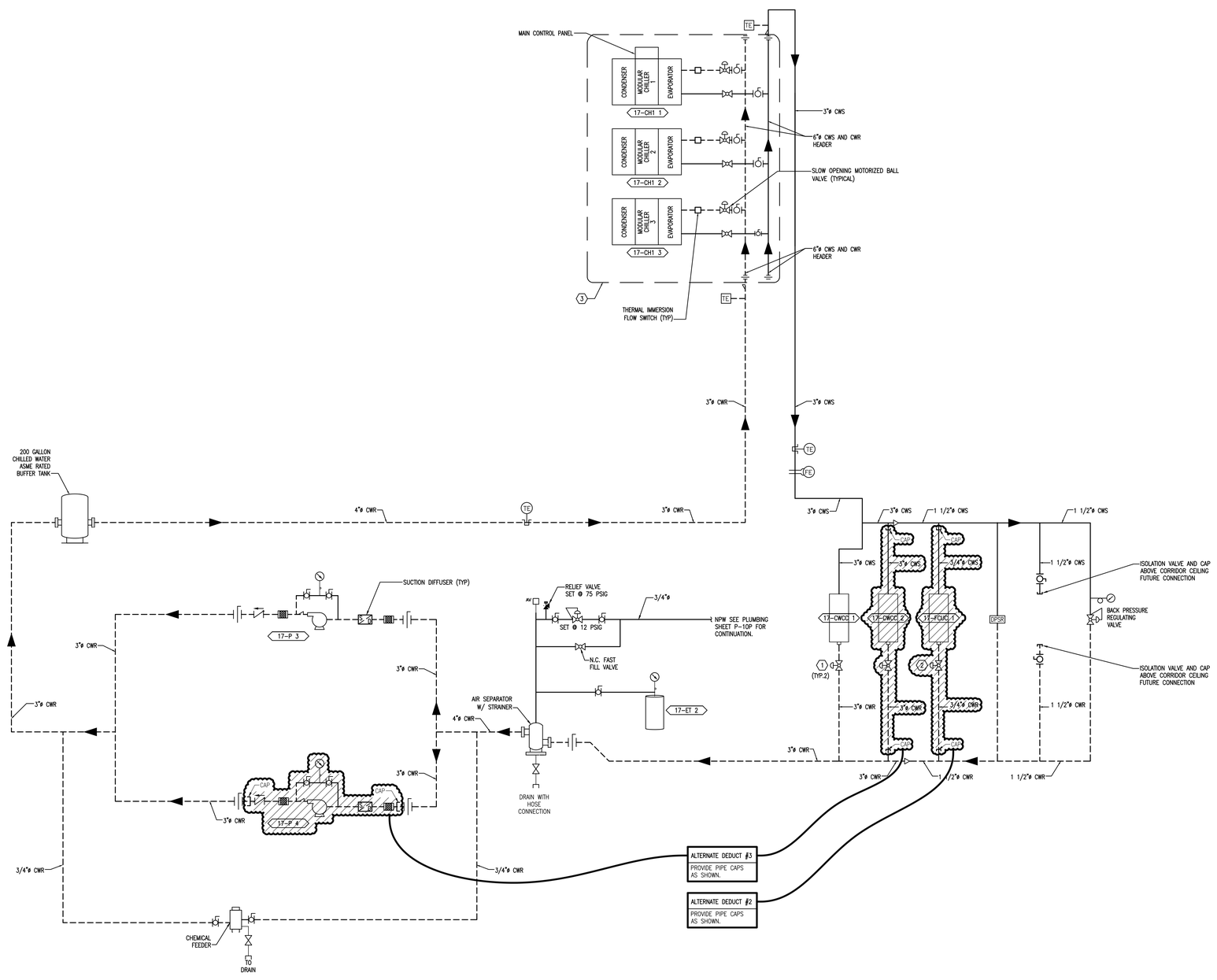
GENERAL NOTES:

A. –

KEYED NOTES:

1. FOR VALVES, FITTINGS, AND ACCESSORIES AT CHW COIL, SEE DETAIL D6/M-502.
2. [illegible]
3. EQUIPMENT SHOWN WITHIN THE DASHED LINE SHALL BE PROVIDED AS A PACKAGED SKID. EACH CHILLER MODULE SHALL BE CONNECTED AS A PACKAGED UNIT AS SHOWN WITHIN THE DASHED LINE.

ALTERNATE DEDUCT #2



F1 CHILLED WATER FLOW
NTS

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title
MECHANICAL CHILLED WATER FLOW DIAGRAMS

Approved : Project Director

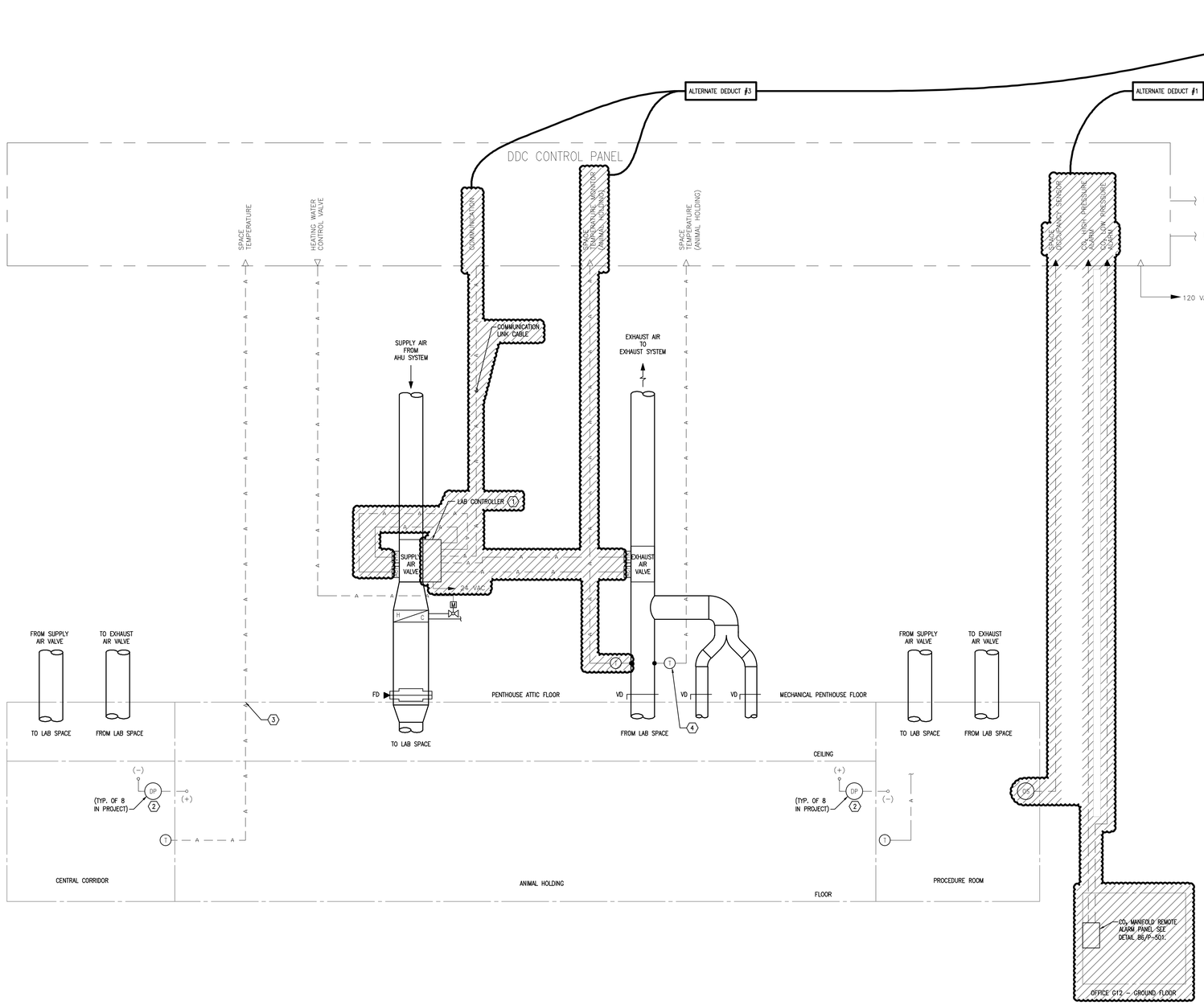
Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date: **04 March 2011** | Checked by: BJ | Drawn: RM

Project Number: **662-10-608**
Building Number: **17**
Drawing number: **M-702**

Office of Construction and Facilities Management
Department of Veterans Affairs



GENERAL NOTES:

A. TYPICAL LABORATORY CONTROL IS APPLICABLE TO ALL SPACES.
B. ALL SPACES WITH THE EXCEPTION OF ALL ANIMAL HOLDING ROOMS SHALL BE PROVIDED WITH AN OCCUPANCY SENSOR, AS SHOWN ON THE FLOOR PLAN.

KEYED NOTES:

1. LAB CONTROLLER SHALL BE PLACED ADJACENT TO THE SUPPLY AIR VALVE.
2. DIFFERENTIAL PRESSURE MONITOR SHALL BE WALL MOUNTED AT 5 FT AFF.
3. SEAL CONDUIT AND JUNCTION BOXES BELOW MECHANICAL PENTHOUSE FLOOR.
4. SPACE TEMPERATURE SENSING FOR ANIMAL HOLDING SPACES SHALL BE LOCATED IN THE ROOM EXHAUST DUCT AHEAD OF THE RACK AHU BRANCH CONNECTIONS. IN ADDITION A SECOND SENSOR SHALL BE INSTALLED FOR MONITORING.

LABORATORY SPACE CONTROL

SEQUENCE OF OPERATION

GENERAL:

THE TYPICAL LABORATORY SPACE SYSTEM SHALL CONSIST OF SUPPLY AND EXHAUST AIR PRESSURE CONTROL VALVES. EACH SUPPLY AIR VALVE WILL BE PROVIDED WITH AN ASSOCIATED HOT WATER REHEAT COIL. ALL SETPOINTS SHALL BE ADJUSTABLE.

TOLERANCES AND SETPOINTS:

SPACE COOLING TOLERANCE: 2 DEGREES F
SPACE COOLING SETPOINT: ADJUSTABLE
SPACE HEATING TOLERANCE: 2 DEGREES F
SPACE HEATING SETPOINT: ADJUSTABLE

SPACE TEMPERATURE CONTROL:

A TEMPERATURE SENSOR IN EACH SPACE SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE REHEAT COIL CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT THE DESIRED SETPOINT.

A SECOND SPACE TEMPERATURE SENSOR SHALL BE PROVIDED FOR THE ANIMAL HOLDING ROOMS. SHOULD THE TEMPERATURE DIFFERENCE BETWEEN THE TWO SENSORS EXCEED 2°F AN ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL, THE BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

SPACE PRESSURIZATION CONTROL:

EACH SUPPLY AIR PRESSURE CONTROL VALVE SHALL BE PROVIDED WITH AN INTEGRAL LABORATORY CONTROLLER. AN AIRFLOW MEASURING ELEMENT IN EACH SUPPLY AND EXHAUST AIR CONTROL VALVE SHALL PROVIDE INPUT TO THE LABORATORY CONTROLLER. THE LABORATORY CONTROLLER SHALL MODULATE THE AIRFLOW CONTROL DEVICE IN THE SUPPLY VALVES, AS REQUIRED TO MAINTAIN THE AIRFLOW SETPOINTS AND REQUIRED SUPPLY AIR OFFSET. AIRFLOW SETPOINTS SHALL BE ADJUSTED MANUALLY, DURING START-UP AND COMMISSIONING TO ACHIEVE THE REQUIRED DIFFERENTIAL PRESSURE FOR THE SPACE.

UNOCCUPIED PERIOD VENTILATION SET-BACK:

AN OCCUPANCY SENSOR IN EACH SPACE, AS SHOWN ON THE FLOOR PLANS, SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. DURING NORMALLY UNOCCUPIED HOURS (DAILY 8:00 PM TO 6:00 AM – FIELD ADJUSTABLE) THE DDC SHALL RESET SPACE EXHAUST FLOWS FOR ALL SPACES, EXCEPT ANIMAL HOLDING, FROM THE MAXIMUM TO THE MINIMUM AIR VALVE SCHEDULED VALUES. SHOULD THE OCCUPANCY SENSOR INDICATE PERSONNEL ARE PRESENT, THE AIR FLOW SHALL RETURN TO MAXIMUM.

CO_2 MANIFOLD REMOTE ALARMS:

DRY CONTACTS IN THE REMOTE ALARM PANEL SHALL BE CONNECTED TO THE DDC. A HIGH PRESSURE OR LOW PRESSURE ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL, THE BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

F1 TYPICAL LABORATORY SPACE CONTROL DIAGRAM

SCALE: NTS

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title: LABORATORY SPACE CONTROL DIAGRAMS

Approved : Project Director

Project Title: **VMU Replacement And Expansion Project**

Location: **San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121**

Date: **04 March 2011** | Checked by: BJ | Drawn: RM

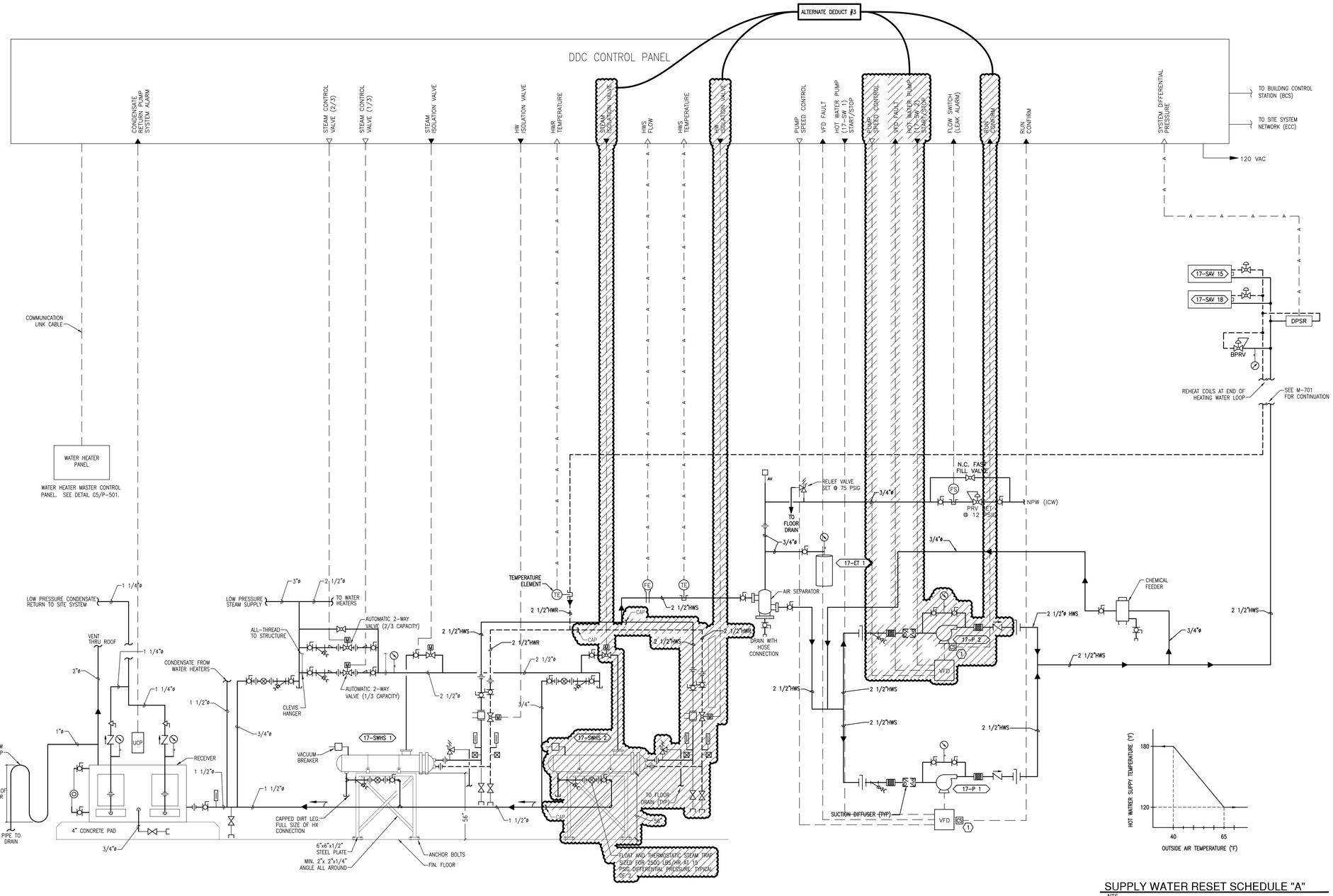
Project Number: **662-10-608**

Building Number: **17**

Drawing number: **M-703**

Office of Construction and Facilities Management

Department of Veterans Affairs



SUPPLY WATER RESET SCHEDULE "A"
NTS

GENERAL NOTES:

A. –

KEYED NOTES:

1. CURRENT SWITCHES SHALL BE PROVIDED AND INSTALLED BY CONTROLS TRADE.
2. NOT USED.

HEATING HOT WATER SYSTEM

SEQUENCE OF OPERATION

GENERAL:

THE SYSTEM SHALL CONSIST OF TWO HOT WATER CONVERTORS WITH ASSOCIATED HEATING WATER PUMPS. ALL SETPOINTS SHALL BE ADJUSTABLE. THE HEATING SYSTEM SHALL RUN CONTINUOUSLY WHEN THE BUILDING IS OCCUPIED.

TOLERANCES AND SETPOINTS:

HEATING WATER SUPPLY TOLERANCE: +/– 2 DEGREE F.
HEATING WATER SUPPLY TEMPERATURE SETPOINT: RESETTABLE PER SCHEDULE 'A'.

SYSTEM ALARMS AND STAND-BY CONTROL:

STATUS OF OPERATING PUMPS SHALL BE MONITORED BY A CURRENT SWITCH IN EACH PUMP MOTOR POWER CIRCUIT. SHOULD ANY PUMP COMMANDED TO RUN INDICATE A LOSS OF POWER, AN ALARM SHALL BE INDICATED AT THE LOCAL DDC, BUILDING DDC WORKSTATION AND SITE CENTRAL CONTROL STATION. SHOULD A PUMP FAIL, THE DDC SYSTEM SHALL THEN SEND A SIGNAL TO DEACTIVATE THE FAILED PUMP WHILE SENDING A SIGNAL TO ENERGIZE THE STAND-BY PUMP.

SHOULD TEMPERATURES IN THE HEATING WATER SUPPLY DEVIATE BY MORE THAN 5 DEGREES F FROM THE SETPOINT ANTICIPATED, AN ALARM CONDITION SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

SHOULD THE TEMPERATURE OF THE HOT WATER SUPPLY DROP MORE THAN 10 DEGREES BELOW SETPOINT, THE DDC SHALL SENT A SIGNAL TO CLOSE THE STEAM VALVE SUPPLYING THE OPERATING CONVERTOR, WHILE SENDING A SIGNAL TO OPEN THE STEAM VALVE SUPPLYING THE STAND-BY CONVERTOR.

SYSTEM START / STOP CONTROL:

THE BUILDING DDC SYSTEM SHALL SEND A SIGNAL TO ENERGIZE THE LEAD PUMP, WHICH SHALL RUN CONTINUOUSLY. ONCE FLOW IS CONFIRMED, THE DDC SHALL SEND A SIGNAL TO OPEN THE LEAD CONVERTOR STEAM VALVE. LEAD / LAG CONVERTOR AND PUMP SELECTION SHALL AUTOMATICALLY CYCLE ON A MONTHLY BASIS. WHEN STARTING THE LAG CONVERTOR FOR ANY REASON, THE DDC SHALL SEND A SIGNAL TO CLOSE THE LEAD CONVERTOR STEAM VALVE WHILE CLOSING THE ASSOCIATED HWR ISOLATION VALVE. THE HWR ISOLATION VALVE SHALL BE SLOW CLOSING, AND NOT BE FULLY CLOSED UNTIL APPROXIMATELY ONE MINUTE. THE DDC SYSTEM SHALL SIMULTANEOUSLY SEND A SIGNAL TO OPEN THE SLOW OPERATING HWR VALVE ON THE LAG CONVERTOR. ONCE THE FLOW IS FULLY DIVERTED TO THE LAG CONVERTOR AND FLOW IS CONFIRMED, THE DDC SYSTEM SHALL OPEN THE LAG CONVERTOR STEAM VALVE.

WHEN SWITCHING FROM THE LEAD PUMP TO THE LAG PUMP, THE DDC SYSTEM SHALL SEND A SIGNAL TO ENERGIZE THE LAG PUMP. THE PUMP SHALL RAMP UP SLOWLY IN SPEED. ONCE THE CURRENT SWITCH CONFIRMS PUMP OPERATION, THE DDC SHALL RAMP DOWN AND DE-ENERGIZE THE LEAD PUMP.

HEATING WATER TEMPERATURE CONTROL:

ONCE PROVIDED A SIGNAL FROM THE DDC SYSTEM TO OPERATE AND HOT WATER FLOW IS CONFIRMED, THE DDC SYSTEM SHALL MODULATE THE TWO STEAM VALVES, IN SERIES (1/3 FOLLOWED BY 2/3), AS REQUIRED TO MAINTAIN THE REQUIRED TEMPERATURE SETPOINT.

PUMP CAPACITY CONTROL:

A DIFFERENTIAL PRESSURE SENSOR ACROSS THE SUPPLY AND RETURN LINES NEAR THE END OF THE LOOP SHALL PROVIDE INPUT TO THE DDC SYSTEM. AS THE LOAD INCREASES AND THE MODULATING CONTROL VALVES AT THE HEATING COILS BEGIN TO OPEN, THE PRESSURE DIFFERENTIAL SHALL DECREASE. THE DDC SYSTEM SHALL MODULATE THE VFDS OF THE PUMPS IN ORDER TO MAINTAIN THE DESIRED DIFFERENTIAL PRESSURE (FIELD MEASURED). VFD FAULT CONDITIONS SHALL BE INDICATED AT THE DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

MINIMUM SYSTEM FLOW CONTROL:

THE VARIABLE FREQUENCY DRIVE (VFD) OF ANY OPERATING PUMP SHALL NOT BE PERMITTED TO OPERATE BELOW 15 HZ. IN ORDER TO MAINTAIN SUPPLY PRESSURE WITH THE VFDS LOCKED AT THIS MINIMUM SPEED, A BACK PRESSURE REGULATING VALVE (BPRV) NEAR THE END OF THE SYSTEM SHALL BE SET TO A VALUE OF 2 PSIG ABOVE THE PRESSURE MEASURED IN THE SUPPLY LINE WHEN THE PUMP VFD FIRST REACHES 15 HZ.

LEAK ALARM:

A FLOW SWITCH WITH ADJUSTABLE SETPOINT SHALL BE INSTALLED IN THE NON-POTABLE (INDUSTRIAL) WATER MAKE-UP LINE. ONCE THE SYSTEM IS INITIALLY FILLED, AN ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION, SHOULD THE FLOW SWITCH INDICATE ANY FLOW.

WATER HEATER MONITORING:

A COMMUNICATION LINK SHALL BE PROVIDED FROM THE WATER HEATER MASTER CONTROL PANEL TO THE DDC PANEL. THE LINK SHALL PROVIDE ACCESS TO ALL WATER HEATER INPUT/OUTPUT DATA AND ALARM CONDITIONS.

F1 HEATING HOT WATER CONTROLS
NTS

NO	REVISIONS	DATE

Contract Documents Submission (CD3 - 100%)

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Drawing Title
MECHANICAL HEATING HOT WATER CONTROL DIAGRAMS

Approved : Project Director

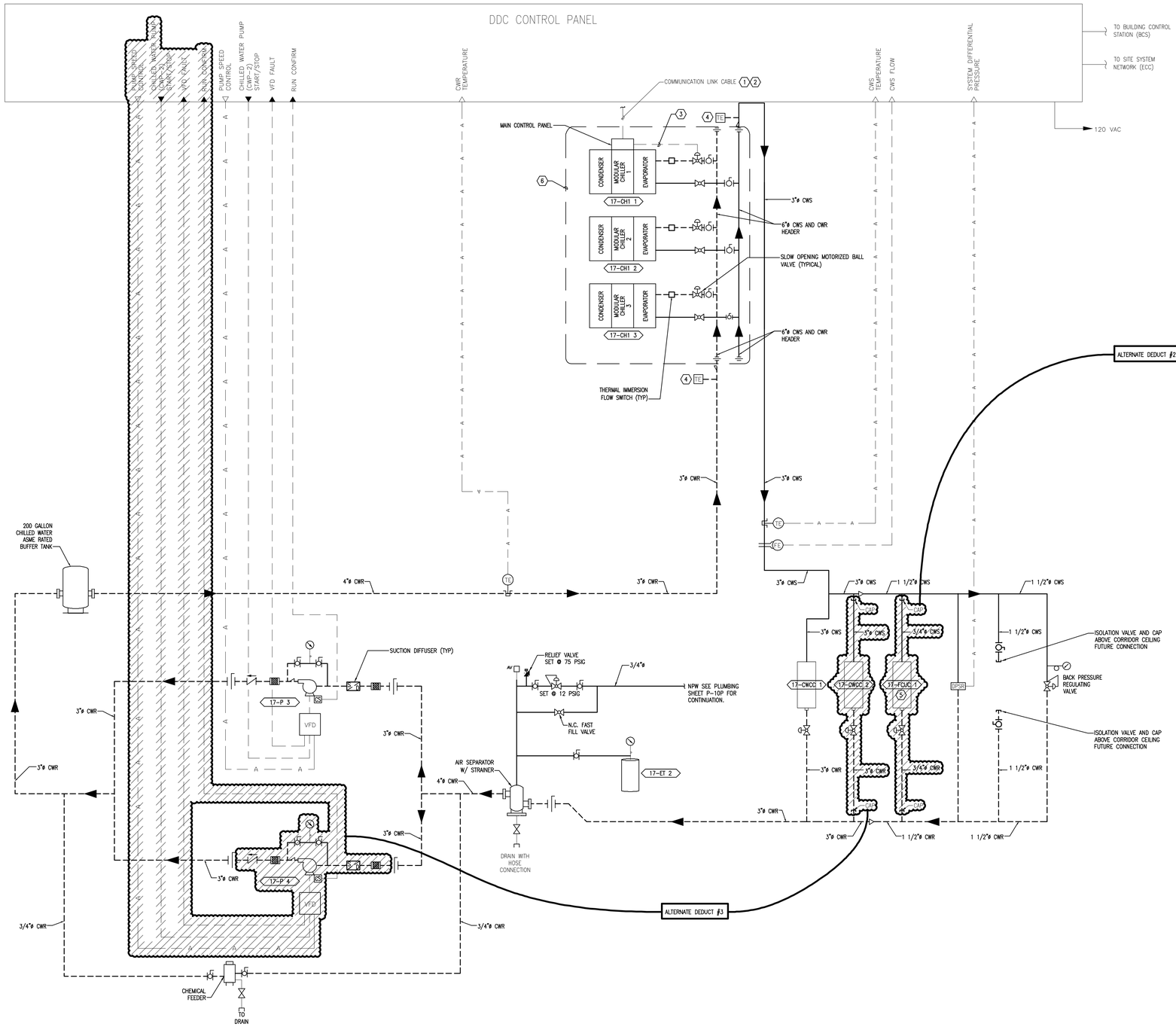
Project Title
VMU Replacement And Expansion Project

Location
San Francisco VA Medical Center
4150 Clement Street, San Francisco, CA 94121

Date	Checked by	Drawn
04 March 2011	BJ	NB

Project Number: 662-10-608
Building Number: 17
Drawing number: M-704

Office of Construction and Facilities Management
Department of Veterans Affairs



F1 CHILLED WATER CONTROL DIAGRAM
NTS

GENERAL NOTES:

A. SEE SHEET M-100 FOR GENERAL NOTES AND LEGENDS.
B. CONTRACTOR TO PROVIDE ALL STEP-DOWN TRANSFORMERS TO CONVERT 120 VOLT POWER TO LOWER VOLTAGE AS REQUIRED.

KEYED NOTES:

1. PROVIDE DEDICATED 120 VOLT POWER TO CHILLER PLANT LOCAL CONTROL PANEL.
2. PROVIDE UTP CABLE FROM CHILLER PLANT LOCAL CONTROL PANEL TO CONTROL SYSTEM NETWORK.
3. INTERLOCK CONTROL WIRING BY CHILLER MANUFACTURER TO ACTIVATE MOTORIZED VALVES AND VERIFY FLOWS AS CHILLER MODULES ARE ENERGIZED AND DE-ENERGIZED.
4. WATER TEMPERATURE SENSOR FURNISHED WITH CHILLER UNIT TO STAGE CHILLER MODULES. FIELD INSTALLED.
5. [illegible]
6. EQUIPMENT SHOWN INSIDE DASHED AREA SHALL BE PROVIDE INTEGRAL WITH MODULAR CHILLERS.

CHILLED WATER SYSTEM

SEQUENCE OF OPERATION

GENERAL:

THE SYSTEM SHALL CONSIST OF A FOUR UNIT, AIR-COOLED, MODULAR CHILLER WITH ASSOCIATED PRIMARY CHILLED WATER PUMPS. ALL SETPOINTS SHALL BE ADJUSTABLE.

TOLERANCES AND SETPOINTS:

CHILLED WATER SUPPLY TOLERANCE: +/- 1 DEGREE F.
CHILLED WATER SUPPLY TEMPERATURE SETPOINT: 44 DEGREES F.

SYSTEM ALARMS:

STATUS OF THE OPERATING CHILLER MODULES AND PUMPS SHALL BE MONITORED BY THE DDC SYSTEM. SHOULD A CHILLER MODULE SHUT-DOWN ON ANY SAFETY CONTROL FUNCTION, A GENERAL ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

STATUS OF OPERATING PUMPS SHALL BE MONITORED BY A CURRENT SWITCH IN EACH PUMP MOTOR POWER CIRCUIT. SHOULD ANY PUMP COMMANDED TO RUN INDICATE A LOSS OF POWER, AN ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

SHOULD THE TEMPERTURE IN THE CHILLED WATER SUPPLY LINE DEVIATE BY MORE THAN 5 DEGREES F FROM THE TOLERANCES SHOWN, AN ALARM CONDITION SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

SYSTEM START / STOP CONTROL:

DURING OCCUPIED HOURS, SHOULD THE OUTSIDE AIR TEMPERATURE, AS MEASURED AT THE AIR HANDLING UNITS, RISE ABOVE 56 DEGREES F THE DDC SYSTEM SHALL SEND A SIGNAL TO ENERGIZE THE CHILLED WATER SYSTEM. THE DDC SHALL FIRST ENERGIZE THE CHILLED WATER PUMPS. ONCE CHILLED WATER FLOW HAS BEEN VERIFIED THE DDC SHALL SEND A SIGNAL TO PERMIT THE MODULAR CHILLER TO STAGE ON.

LEAD / LAG PUMP SELECTION SHALL AUTOMATICALLY CYCLE ON A MONTHLY BASIS. WHEN SWITCHING FROM THE LEAD PUMP TO THE LAG PUMP, THE DDC SYSTEM SHALL SEND A SIGNAL TO ENERGIZE THE LAG PUMP. THE PUMP SHALL RAMP UP SLOWLY IN SPEED. ONCE THE CURRENT SWITCH CONFIRMS PUMP OPERATION, THE DDC SHALL RAMP DOWN AND DE-ENERGIZE THE LEAD PUMP.

CHILLED WATER TEMPERATURE CONTROL:

ONCE PROVIDED A SIGNAL FROM THE DDC SYSTEM TO OPERATE, THE CHILLER UNIT MAIN CONTROL PANEL (MCP) SHALL OPEN THE CHILLED WATER MOTORIZED VALVES OF THE MODULE TO BE ENERGIZED AND SHALL VERIFY CHILLED WATER FLOW THRU THE MODULE UTILIZING A FLOW SWITCH FURNISHED WITH EACH CHILLER MODULE. ONCE FLOWS ARE VERIFYED A RETURN WATER TEMPERATURE SENSOR FURNISHED WITH THE CHILLER UNIT SHALL PROVIDE INPUT TO THE CHILLER MCP. THE CHILLER MPC SHALL STAGE ON / OFF CHILLER MODULES AS REQUIRED TO MEET THE CHILLED WATER SYSTEM LOAD.

PUMP CAPACITY CONTROL:

A DIFFERENTIAL PRESSURE SENSOR ACROSS THE SUPPLY AND RETURN LINES NEAR THE END OF THE LOOP SHALL PROVIDE INPUT TO THE DDC SYSTEM. AS THE LOAD INCREASES AND THE MODULATING CONTROL VALVES AT THE COOLING COILS BEGIN TO OPEN, THE PRESSURE DIFFERENTIAL SHALL DECREASE. THE DDC SYSTEM SHALL MODULATE THE VFDS OF THE CHILLED WATER PUMPS IN ORDER TO MAINTAIN THE DESIRED DIFFERENTIAL PRESSURE (FIELD MEASURED). VFD FAULT CONDITIONS SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

MINIMUM SYSTEM FLOW CONTROL:

THE VARIABLE FREQUENCY DRIVE (VFD) OF ANY OPERATING PUMP SHALL NOT BE PERMITTED TO OPERATE BELOW 15 HZ. IN ORDER TO MAINTAIN SUPPLY PRESSURE WITH THE VFDS LOCKED AT THIS MINIMUM SPEED, A BACK PRESSURE REGULATING VALVE (BPRV) AT THE END OF THE SYSTEM SHALL BE SET TO A VALUE OF 2 PSIG ABOVE THE PRESSURE MEASURED IN THE SUPPLY LINE WHEN THE PUMP VFD FIRST REACHES 15 HZ.

LEAK ALARM:

A FLOW SWITCH WITH ADJUSTABLE SETPOINT SHALL BE INSTALLED IN THE NON-POTABLE (INDUSTRIAL) WATER MAKE-UP LINE. ONCE THE SYSTEM IS INITIALLY FILLED, AN ALRM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title
MECHANICAL CHILLED WATER CONTROL DIAGRAMS

Approved : Project Director

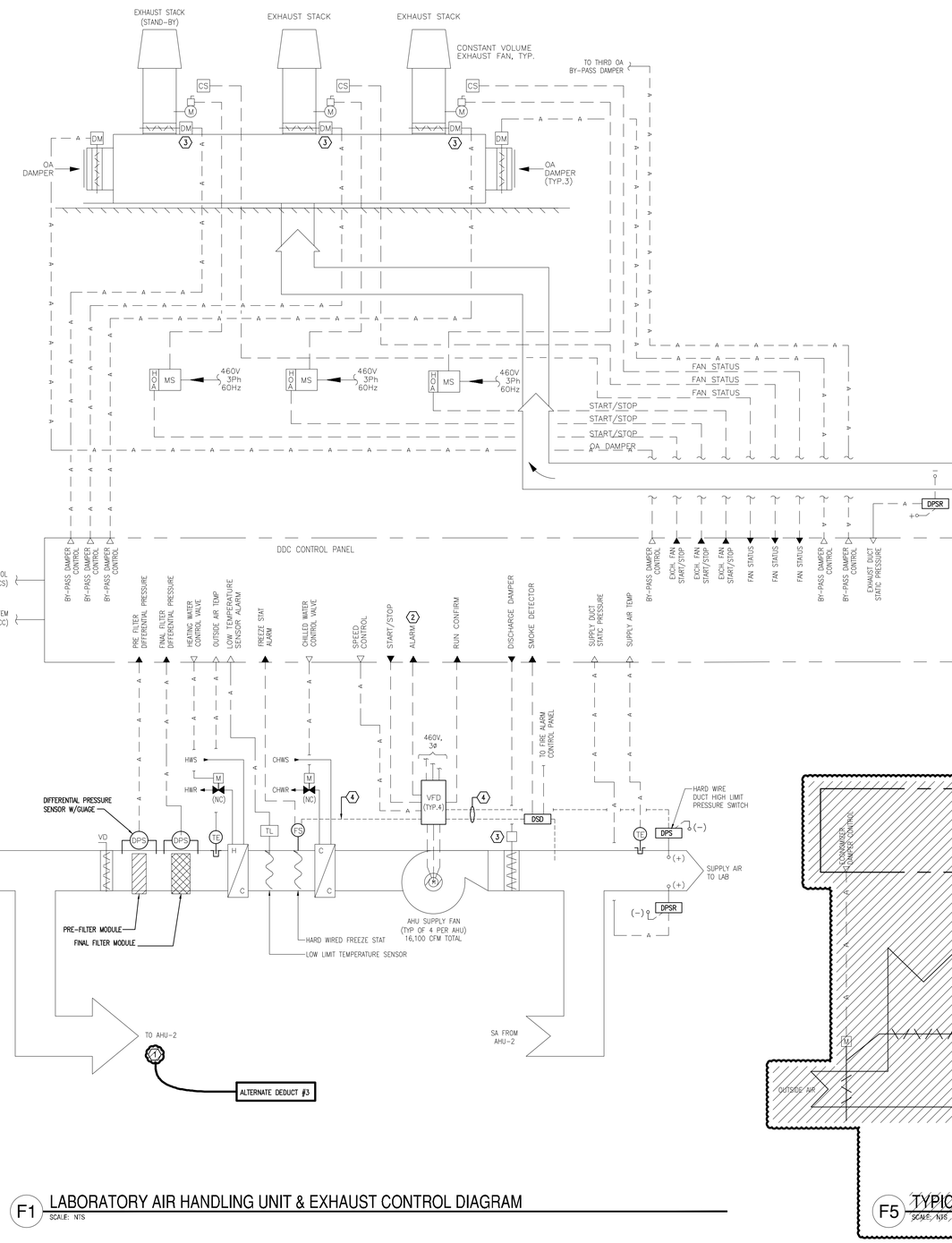
Project Title
VMU Replacement And Expansion Project

Location: San Francisco VA Medical Center, 4150 Clement Street, San Francisco, CA 94121

Date: 04 March 2011 | Checked by: BJ | Drawn: NB

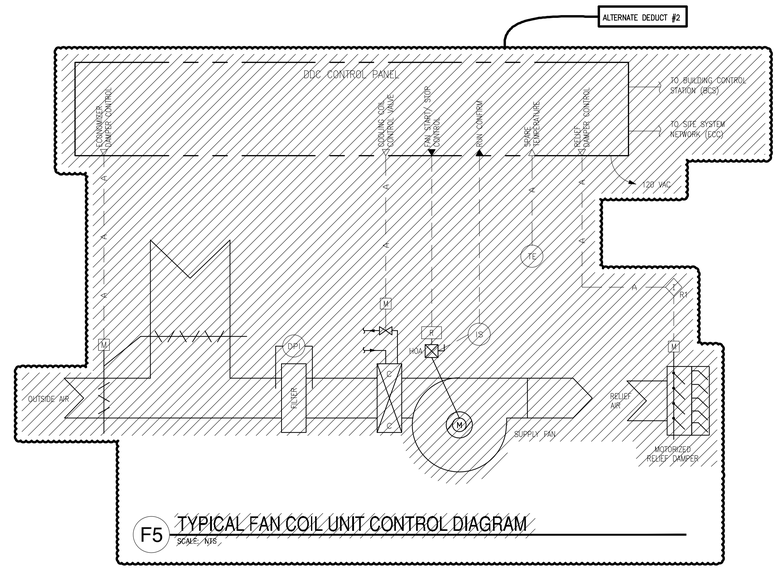
Project Number: 662-10-608
Building Number: 17
Drawing number: M-705

Office of Construction and Facilities Management
Department of Veterans Affairs



F1 LABORATORY AIR HANDLING UNIT & EXHAUST CONTROL DIAGRAM

SCALE: N.T.S



F5 TYPICAL FAN COIL UNIT CONTROL DIAGRAM

SCALE: N.T.S

GENERAL NOTES:

A. -

KEYED NOTES:

1. CONTROLS FOR AHU-2 SHALL BE SIMILAR TO THOSE SHOWN FOR AHU-1.
2. AT CONTRACTORS OPTION, THE VFD's MAY BE LINKED TO THE DDC SYSTEM UTILIZING A NETWORK COMMUNICATION CABLE, PROVIDED THAT ALARM INFORMATION IS OBTAINED.
3. DAMPER SHALL BE POWERED OPEN, NORMALLY CLOSED SPRING RETURN.
4. INTERLOCK WIRING FROM FREEZE STAT, DUCT HIGH LIMIT PRESSURE SWITCH AND DUCT SMOKE DETECTOR (DSD) TO VFDS FOR AHU SHUT-DOWN.

LABORATORY AIR HANDLING UNIT SYSTEM

SEQUENCE OF OPERATION

GENERAL:

THE SYSTEM SHALL CONSIST OF TWO AIR HANDLING UNITS WITH HOT WATER HEATING AND CHILLED WATER COOLING COILS. DIFFERENTIAL PRESSURE SWITCHES ASSOCIATED WITH FILTER GUAGES SHALL BE CONNECTED TO THE DDC SYSTEM. DIRTY FILTER ALARMS SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION. ALL SETPOINTS SHALL BE ADJUSTABLE.

TOLERANCES AND SETPOINTS:
SUPPLY AIR SETPOINT: 55 DEGREES F.
LOW LIMIT TEMPERATURE ALARM: 50 DEGREES F.
FREEZE STAT PROTECTION LIMIT: 45 DEGREES F.

FREEZE CONTROL:

THE LOW LIMIT TEMPERATURE SENSOR AND FREEZE STAT SHALL BE LOCATED ON THE LEAVING SIDE OF THE HEATING COIL. WHEN THE TEMPERATURE LEAVING THE HEATING COIL IS AT OR BELOW THE LOW LIMIT TEMPERATURE ALARM SETPOINT, AN ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION. WHEN THE TEMPERATURE LEAVING THE HEATING COIL IS AT OR BELOW THE FREEZE STAT PROTECTION LIMIT SETPOINT, THE FOLLOWING SHALL OCCUR:

1. THE SUPPLY FANS OF THE ASSOCIATED AHU SHALL BE DE-ENERGIZED.
2. THE COOLING COIL CONTROL VALVE SHALL RETURN TO ITS NORMAL POSITION (CLOSED).
3. THE HEATING COIL CONTROL VALVE SHALL RETURN TO ITS NORMAL POSITION (CLOSED).
4. THE DISCHARGE DAMPERS OF THE ASSOCIATED AHU SHALL GO TO THE FULL CLOSED POSITION.
5. A VISUAL AND AUDIO ALARM SHALL BE TRANSMITTED TO THE BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.
6. A MANUAL RESET OF FREEZE STAT DEVICE SHALL BE REQUIRED.

SYSTEM START / STOP CONTROL:

THE AIR HANDLING UNITS AND EXHAUST FANS SHALL BE STARTED AND STOPPED VIA THE DDC CONTROL SYSTEM. BOTH AIR HANDLING UNITS SHALL NORMALLY OPERATE. TWO OF THE THREE GENERAL EXHAUST FANS SHALL OPERATE AND ONE OF THE BIO-SAFETY CABINET EXHAUST FANS SHALL OPERATE.WHEN THE SYSTEM IS STARTED THE FOLLOWING EVENTS SHALL OCCUR:

1. THE SUPPLY AND EXHAUST AIR FANS SHALL START.
2. THE DISCHARGE DAMPERS OF THE AHUS AND INLET DAMPERS AT THE OPERATING EXHAUST FANS SHALL GO TO THE FULL OPEN POSITION.
3. CONFIRMATION OF AIR FLOW (FAN STATUS) SHALL BE BY ASSOCIATED CURRENT SWITCHES IN EACH FAN MOTOR POWER CIRCUIT. FAN FAILURE SHALL BE ALARMED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

WHEN THE SYSTEM IS SHUTDOWN, THE FOLLOWING EVENTS SHALL OCCUR:

1. THE SUPPLY AND EXHAUST FANS SHALL STOP.
2. THE DISCHARGE DAMPERS OF THE AHUS AND INLET DAMPERS AT THE EXHAUST FANS SHALL GO TO THE FULL CLOSED POSITION.
3. THE COOLING COIL CONTROL VALVES SHALL RETURN TO THE NORMAL POSITION (CLOSED).
4. THE HEATING COIL CONTROL VALVE SHALL RETURN TO THE NORMAL POSITION (CLOSED).

A HAND – OFF – AUTO (HOA) SWITCH AT THE FAN VFD'S SHALL OVERRIDE THE SYSTEM FOR MAINTENANCE USE.

SHOULD AN EXHAUST FAN THAT COMMANDED TO OPERATE FAIL FOR ANY REASON, THE DDC SYSTEM SHALL SEND A SIGNAL TO DE-ENERGIZE THE FAILED UNIT WHILE SENDING A SIGNAL TO ENERGIZE THE STAND-BY UNIT.

SUPPLY AIR TEMPERATURE CONTROL:

A TEMPERATURE SENSOR IN THE SUPPLY AIR STREAM SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE DDC CONTROL SYSTEM SHALL MODULATE THE HEATING COIL CONTROL VALVE AND COOLING COIL CONTROL VALVE AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE AT THE DESIRED SETPOINT. THE SUPPLY AIR TEMPERATURE SHALL NORMALLY BE 55 DEGREES F. THE DDC SYSTEM SHALL MONITOR THE CONTROL SIGNAL BEING SENT TO ALL REHEAT COILS EVERY 5 MINUTES. SHOULD ALL REHEAT COIL CONTROL VALVES BE OPEN, THE DDC SYSTEM SHALL RAISE THE SUPPLY AIR TEMPERATURE 1 DEGREE F. THIS SHALL CONTINUE ON A 5 MINUTE CYCLE UNTIL ONE REHEAT COIL CONTROL VALVE IS FULLY CLOSED. IF AT THE END OF ANY CYCLE THE SPACE TEMPERATURE IN ANY ROOM RISES ABOVE SETPOINT, THE DDC CONTROL SYSTEM SHALL LOWER THE SUPPLY AIR TEMPERATURE 1 DEGREE F. THE SUPPLY AIR TEMPERATURE SHALL BE LOWERED EVERY 5 MINUTES UNTIL ROOM SETPOINT IS ACHIEVED. AFTER 5 MINUTES, IF THE DDC SYSTEM CONFIRMS ROOM TEMPERTAURE SETPOINT HAS BEEN ACHIEVED, THE SUPPLY AIR TEMPERATURE RESET CYCLE SHALL BE REINITIATED.

SUPPLY FAN CAPACITY CONTROL:

A STATIC PRESSURE SENSOR IN THE SUPPLY AIR DUCTWORK SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE CONTROL SYSTEM SHALL MODULATE ALL FAN SPEEDS SIMULTANEOUSLY IN BOTH AIR HANDLING UNITS, UTILIZING THE VFDS, AS REQUIRED TO MAINTAIN THE DESIRED DUCT STATIC PRESSURE (FIELD MEASURED). VFD SPEED FEEDBACK AND FAULT CONDITIONS SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

EXHAUST FAN CAPACITY CONTROL:

A STATIC PRESSURE SENSOR IN THE EXHAUST AIR DUCTWORK OF BOTH EXHAUST SYSTEMS SHALL PROVIDE INPUT TO THE DDC CONTROL SYSTEM. THE CONTROL SYSTEM SHALL MODULATE THE OUTSIDE AIR BY-PASS DAMPERS OF BOTH EXHAUST SYSTEMS, AS REQUIRED TO MAINTAIN THE DESIRED DUCT STATIC PRESSURE (FIELD MEASURED).

DUCT SMOKE DETECTOR CONTROL:

WHENEVER THE SUPPLY AIR SMOKE DETECTOR IS ACTIVATED, A SIGNAL IS SENT TO THE FIRE ALARM CONTROL PANEL, AND THE FOLLOWING EVENTS SHALL OCCUR:

1. AN ALARM IS ANNUNCIATED AT THE FIRE ALARM CONTROL PANEL.
2. THE ASSOCIATED AHU SYSTEM SHALL SHUT DOWN AS DESCRIBED ABOVE.
3. AN ALARM SHALL BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

FAN COIL UNIT

SEQUENCE OF OPERATION

GENERAL:

THE SYSTEM SHALL CONSIST OF A FAN COIL UNIT WITH CHILLED WATER COOLING COIL. THE SYSTEM SHALL BE CONNECTED TO THE DDC SYSTEM. ALL SETPOINTS SHALL BE ADJUSTABLE.

TOLERANCES AND SETPOINTS:

SPACE COOLING TOLERANCE: 4 DEGREES F.
SPACE COOLING SETPOINT: 80 DEGREES F.
SPACE TEMPERATURE LOW ALARM: 60 DEGREES F.
SPACE TEMPERATURE HIGH ALARM: 5 DEGREES F ABOVE SETPOINT.

SYSTEM START / STOP CONTROL:

THE UNIT SHALL BE STARTED AND STOPPED VIA THE DDC SYSTEM.WHEN THE SPACE TEMPERATURE EXCEEDS THE SETPOINT; THE FAN COIL SHALL BE ENERGIZED. THE FAN COIL SHALL SHUT DOWN WHEN THE SPACE TEMPERATURE IS 5 DEGREES F BELOW SET POINT. OPERATING STATUS OF THE FAN COIL UNIT SHALL BE MONITORED BY A CURRENT SENSOR. SHOULD THE UNIT BE COMMANDED ON, BUT FAIL TO OPERATE, AN ALARM SHALL BE INDICATED BE INDICATED AT THE LOCAL DDC PANEL AND BUILDING DDC WORKSTATION WITH REMOTE INDICATION AT THE SITE CENTRAL CONTROL STATION.

ECONOMIZER (FREE COOLING) CONTROL:

WHEN THE UNIT IS OPERATING, SHOULD THE OUTSIDE AIR TEMPERATURE BE BELOW THE SPACE TEMPERATURE BY AT LEAST 2 DEGREES F THE DDC SHALL MODULATE OPEN THE OUTSIDE AIR DAMPERS, WHILE MODULATING CLOSED THE RETURN AIR DAMPERS, IN AN EFFORT TO USE OUTSIDE AIR FOR FREE COOLING. SHOULD THE OUTSIDE AIR TEMPERATURE RISE ABOVE THE SPACE TEMPERATURE THE OUTSIDE AIR DAMPERS SHALL MODULATE FULL CLOSED WHILE THE RETURN AIR DAMPERS MODULATE FULL OPEN.

SPACE COOLING CONTROL:

A TEMPERATURE SENSOR IN THE SPACE SHALL PROVIDE INPUT TO THE CONTROL SYSTEM. THE DDC SYSTEM SHALL MODULATE THE COOLING COIL CONTROL VALVE OPEN AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT THE DESIRED SETPOINT.

Contract Documents Submission (CD3 - 100%)

NO	REVISIONS	DATE

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Drawing Title: AIR HANDLING CONTROL DIAGRAMS

Approved - Project Director

Project Title: **VMU Replacement And Expansion Project**

Location: **San Francisco VA Medical Center 4150 Clement Street, San Francisco, CA 94121**

Date: **04 March 2011**

Checked by: BJ

Drawn: RM

Project Number: **662-10-608**

Building Number: **17**

Drawing number: **M-706**

Office of Construction and Facilities Management

Department of Veterans Affairs